TM 5-4120-268

DEPARTMENT OF THE ARMY TECHNICAL M

OPERATOR, ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL

AIR CONDITIONER: VERTICAL COMPACT, FLOOR MOUNTED 36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING; 208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL MAC6V40–340–2) FSN 4120–935–5421, 208 VOLT, 3 PHASE, 400 CYCLE (TRANE MODEL MAC4V40–340–3) FSN 4120–935–5418

SAFETY PRECAUTIONS

BEFORE OPERATION

Disconnect air conditioner from power source before performing maintenance on componer unit.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be carefu Refrigerant–22 does not contact eyes. In case of leaks, ventilate area immediately.

DURING OPERATION

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be carefu Refrigerant–22 does not contact eyes. In case of leaks, ventilate area immediately.

Disconnect air conditioner from power source before performing maintenance on componer unit.

Before restart, wait 5 minutes.

AFTER OPERATION

Disconnect air conditioner from power source before performing maintenance on componer unit.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be carefu Refrigerant–22 does not contact eyes. In case of leaks, ventilate area immediately.

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE
WASHINGTON, D.C., *18, Octo*

Operator, Organizational, DS, GS, and Depot Maintenance Manual

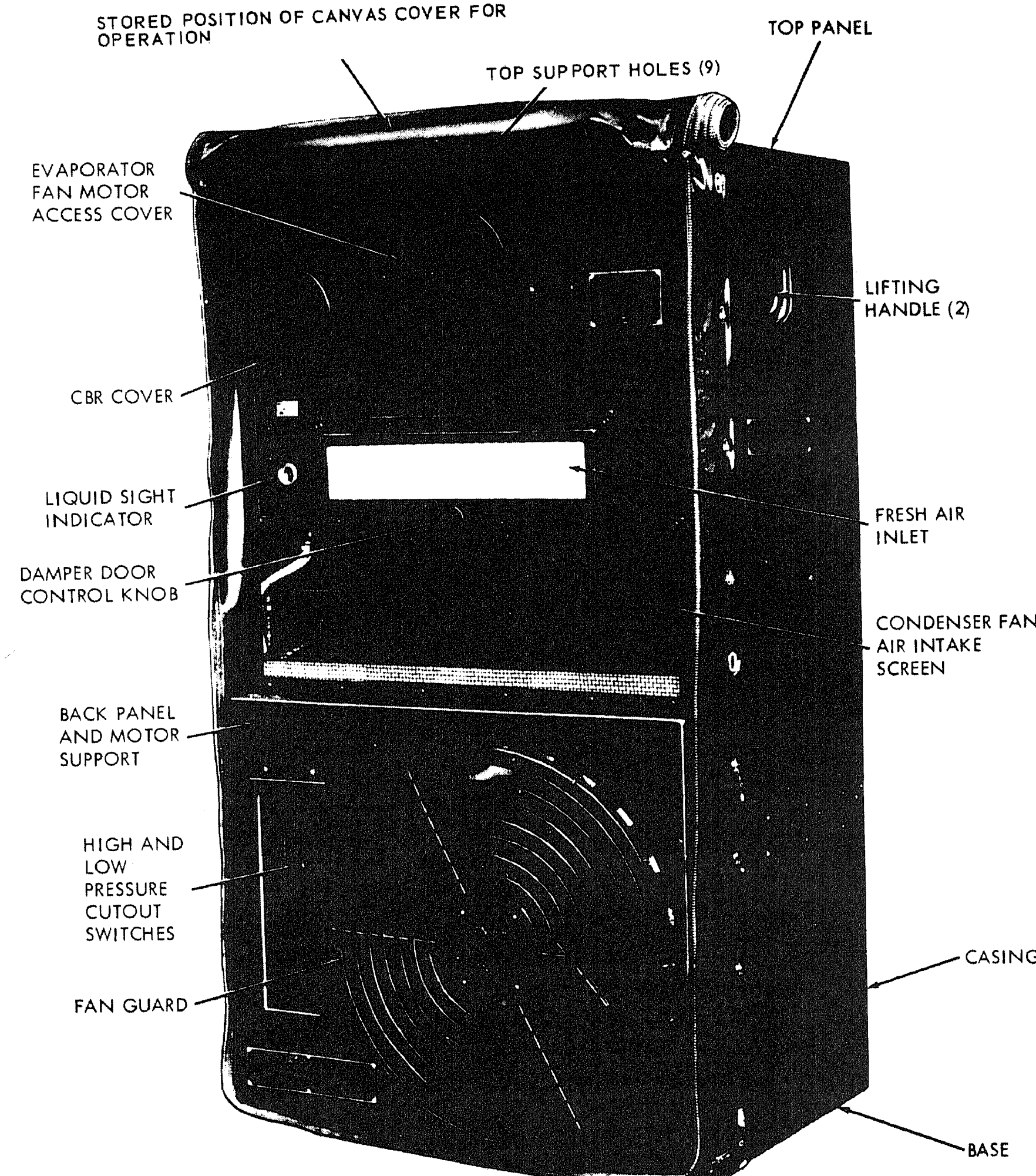
AIR CONDITIONER, VERTICAL, COMPACT; FLOOR MOUNTED; 36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING; 208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL MAC 6V40-340-2) FSN 4120-935-5421; 208 VOLT, 3 PHASE, 400 CYCLE (TRANE MODEL MAC 4V40-340-3) FSN 4120-935-5418

TM 5-4120-268-15, 7 May 1969, is changed as follows:

Page i. Chapter 3, Section VIII. Change "drain piping" to read "drain tube".

Page 1-1. Paragraph *b*. Delete the third sentence and substitute the following:

"Organizational Maintenance Repair Parts cial Tools are listed and illustrated in TM 268-20P. Direct and General Support an Maintenance Repair Parts and Special T listed and illustrated in TM 5-4120-268-35P


STORED POSITION OF CANVAS COVER FOR OPERATION
TOP PANEL
TOP SUPPORT HOLES (9)
EVAPORATOR FAN MOTOR ACCESS COVER
LIFTING HANDLE (2)
CBR COVER
LIQUID SIGHT INDICATOR
FRESH AIR INLET
DAMPER DOOR CONTROL KNOB
CONDENSER FAN AIR INTAKE SCREEN
BACK PANEL AND MOTOR SUPPORT
HIGH AND LOW PRESSURE CUTOUT SWITCHES
CASING
FAN GUARD
BASE

Page 1-4. Paragraph 1-4*a*(3). Delete "This unit charged with 15.5 lbs refrigerant -22" and substitute: MAC4V40-3 Plate: THIS UNIT CHARGED WITH 14 LBS., 15 OZS. REFRIGERANT -22. MAC4V40-340-2 Plate: THIS UNIT CHARGED WITH 13 LBS., 8 OZ REFRIGERANT -22."

Page 1-5. Paragraph 1-4*b* (2) (*d*). In line 5 change "MAC 4V60-340-2" to read "MAC6V40-340-2".

Paragraph 1-4*b* (2) (*f*). In line 3 change part number, "3001X4" to read "3001X4-540".

Paragraph 1-4*b* (3) (*f*). In line 3 change part number "237AVIL-70327-142" to read "237AVIL-70237-142".

Page 1-6. Paragraph 1-4*b* (4) (c). In line 1 change "Metals and Controls, Inc." to read "Texas Instruments, Inc." In line 3 change part number "CWA 1249" to read "Type CWA 1249".

Paragraph 1-4*b* (4) (*d*). Change subparagraph title from "Magnetic contractors" to read "Relays". Change part number "9565H2B" to read "MS2419-2D1".

Paragraph 1-4*b* (4) (*f*). In line 3 change part number "71-212-5MG6" to read "71-212-2MG6".

Paragraph 1-4*b* (4) (*i*). In line 1 change "Reid Hill Electronics" to read "Milwaukee Transformer Co." In line 4 change part number "35666" to read "C1-14423". In line 5 change part number "35566" to read "C1-13490".

Paragraph 1-4*b* (1). In line 2 change part number "5JX100" to read "5JX100, Modified".

Pages 1-7 and 1-8. Figure 1-4 (Sheet 1 of 2) and Figure 1-4 (Sheet 2 of 2). The low pressure cutout switch S6 located in the upper right hand corner of the wiring diagram is in the closed position during normal operation of the air conditioner.

In line 46 of Legend, Part Number Column, change part number for the thermostat from "C13211E8301-1" to "C13211E8301-2".

Page 2-1. Paragraph 2-5. Add the following note

Page 2-6. Paragraph 2-11. Ad
subparagraph *a*: "and make sur
properly stored (fig. 1-2)". Pa
superseded:

c. If the air conditioner fails to
circuit breaker access cover (fig.
the 4 screws and reset the circui

Page 3-4. Figure 3-2—contin
lowing to the Note: "Check top
for loose or broken attaching scr

Page 3-5. Paragraph 3-10. T
is superseded as follows:

3-10. Condenser Fan Guard an Screen.

Paragraph 3-12. Add "fig. 2-2" af
Breaker" and "Push reset buttor
in the Possible remedy column.

Page 3-6. Paragraph 3-17. De
from the Possible Remedy colum
"Stop unit by turning selector
leave unit connected to power li
the following:
"Turn selector switch to OFF, c
to unit".

Page 3-7. Figure 3-3. Add "N

NOTE

1. Remove front access cove

2. Partially remove junction
trol panel (fig. 3-16).

3. Tag electrical leads befor
ing.

Page 3-9. Paragraph 3-27. The
superseded as follows:

3-27. Fresh Air Damper Contro

Subparagraph *b* is superseded as f

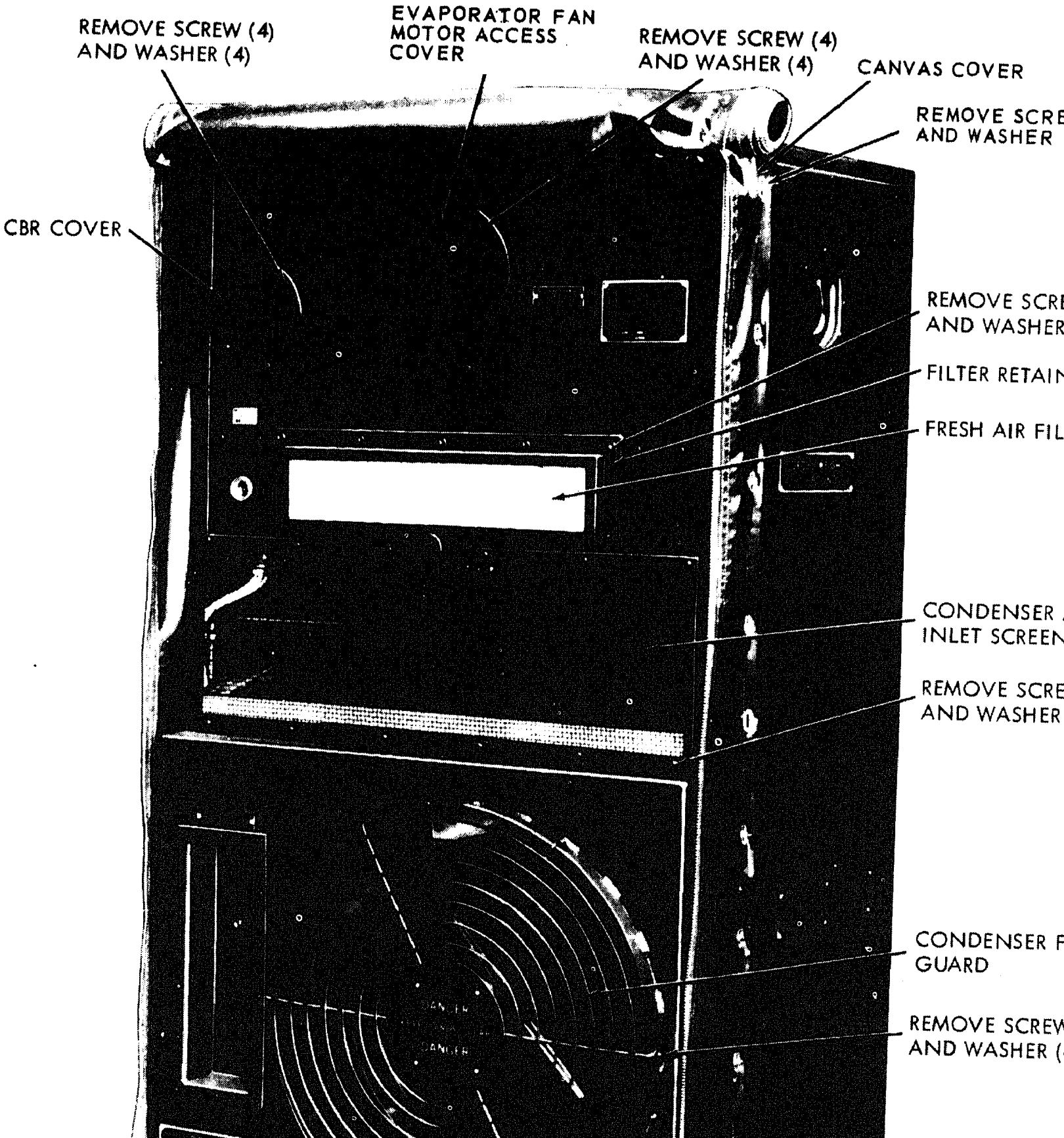
b. Removal.

(1) Remove fresh air filter

(2) Tighten self-locking nut (24) on long screw (23) that passes through worm gear assembly (28) until spring washers (27) begin to compress and place a firm drag on worm gear assembly when turning control rod (30).

Page 3-10. Figure 3-5. Change "(11) and washer (11)" to read "Rem and washer (12)".

Page 3-14. **Figure 3-8 is superseded as follows:**



Page 3-15. Figure 3-9 is superseded as follows:

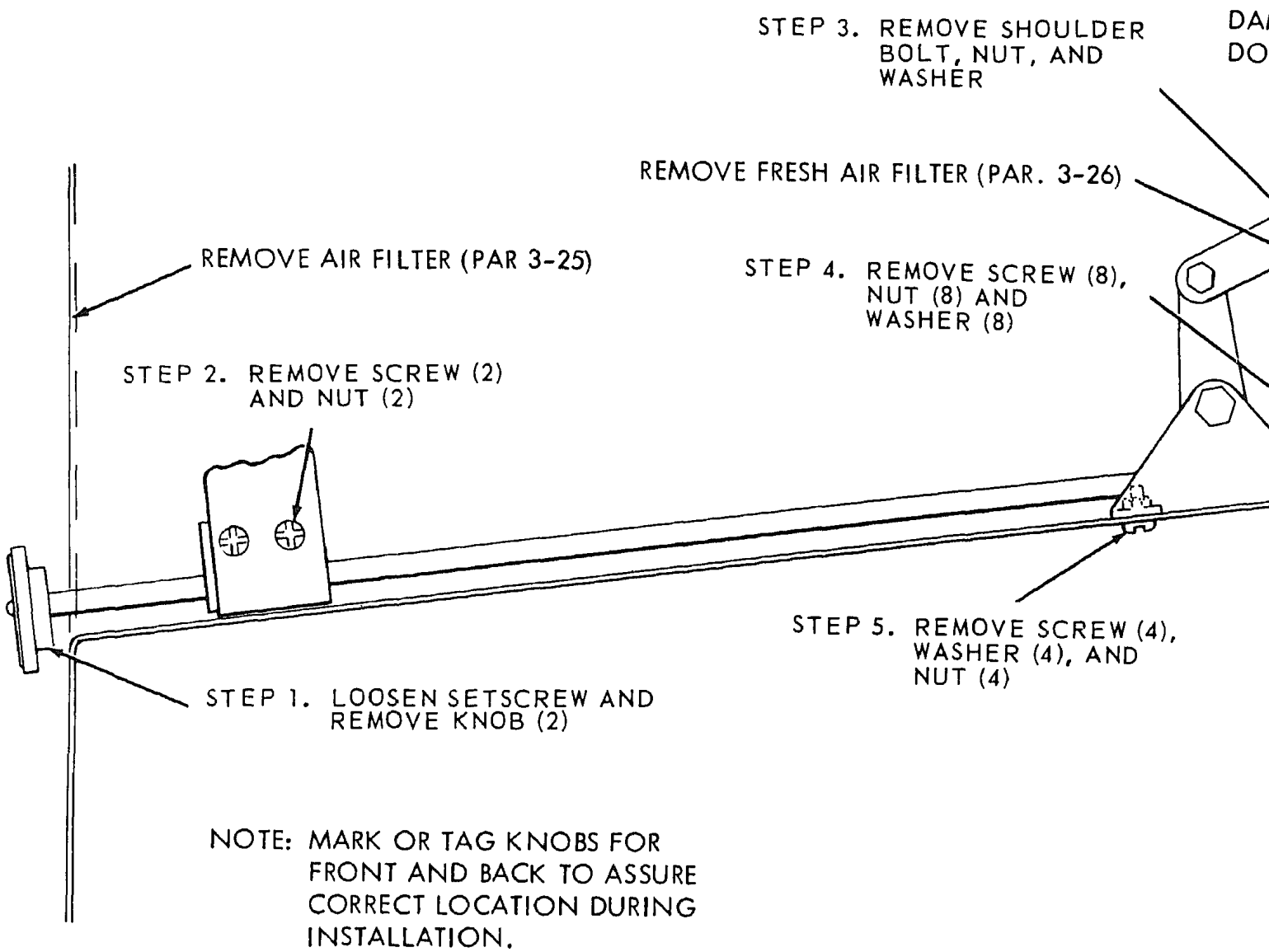


Figure 3-9. Fresh air damper control, removal and installation.

Page 3-18. Paragraph 3-31. Subparagraph *b* is superseded as follows:

b. Maintenance Procedure. Remove top panel, discharge and intake air grilles (para 3-24). Refer to figure 3-11 and perform prescribed maintenance services.

Page 3-20. Figure 3-12. Add the following:

NOTE

Remove front access cover (para 3-24).

Page 3-35. Figure 3-24 (Sheet 1 of 2). The

Add "Install top panel (para 3-24 sentence to subparagraph *d*.

Page 3-38. Paragraph 3-53. Add " graph title.

Page 3-41. Paragraph 3-56. Add connector in first line of subparagrap

Delete subparagraph "*d*".

Change subparagraph "*e*" to read "

Delete the "Note" in its entirety.

Page 3-42. Paragraph 3-57. Subp

Page 6-10 is changed as follows: Delete the "illustration" on left side of the figure. Add following "NOTE" to the illustration.

NOTE

Refer to paragraph 3-38 and remove back panel and motor support for access to pressure switches.

NOTE

Do not disconnect tubing nut (2) for electrical testing.

Page 6-12. Paragraph 6-18. The "NOTE" is superseded:

NOTE

Capacity of Refrigerant -22, FSN 6830-174-9677, in Model MAC4V40-340-3, system is 14 lbs. 15 ozs. and in Model MAC6V40-340-2 system is 13 lbs. 8 ozs.

Page 6-18. Figure 6-15. Step 3 is superseded as follows:

Step 3. Open refrigerant d
and access valve.
2-11) and weigh
of refrigerant -22

Page A-1. Paragraph A-3. D
268-25P", and "Department of the
list and substitute the following:

TM 5-4120-268-20P Department
nical Manua
Maintenance
Special Tools

TM 5-4120-268-35P Department
nical Manual
eral Support
tenance Re
Special Tool

Page C-2. Section II of the
location Chart is superseded as f

Section II. MAINTENANCE ALLOCATION CHART

	(3) Maintenance functions											(4)	(5)
	A	B	C	D	E	F	G	H	I	J	K	Tools and Equipment	Remarks
	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
							C	O					
								O					
								O					
								O					
	C		C					O	O				
								O					
	C		C					O					
								O					
								O	O				
	O							O					
	O							O					
								O					
								O					
	C		C					O					
	C		C					O					
rt								O					
	C		C					O					
	C		C					O					
	O			O				O	O				
	C		O					O					
							O	O					
								O					
								H					
								H					

Section II. MAINTENANCE ALLOCATION CHART

(3) Maintenance functions											(4) Tools and Equipment	(5) Remarks
A	B	C	D	E	F	G	H	I	J	K		
Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	O						O					
							O					
	O						O					
	O						O					
	O						O					
	O						O					
	O						O					
O							O					
O							O					
	O						O					
	O						O					
	O						O					
	O						F					
	O						O					
	O						F					
	O						F					
F	F						F					
	O						F					
	O						O					

Section II. MAINTENANCE ALLOCATION CHART

	(3) Maintenance functions											(4)	(5)
	A	B	C	D	E	F	G	H	I	J	K	Tools and Equipment	Remarks
	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	F							F					
								F					
								F					
		F		F				F					
			O					F					
			O					F					
		O						O					
		O						O					
								O					
								O					
	O	O						O	O				
								O					
								O					
	O	O						O	O				
	O	O						O	O				
	O	O						O					
	O	O						O					
	O	O						O					

Page I-1. Index. Change line 35 to read "Fresh air filter, CBR cover, motor access cover, fanguard and condenser air inlet screen. After line 36, condenser fan, add "Condenser fan guard and air inlet screen. para 3-10, page 3-5.

Page I-2. Index. Change line lows "Fresh air damper control".

By Order of the Secretary of the Army:

W. C. WESTMOR
General, United St
Chief of Staff.

Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-25, Section III, (qty rqr block No. 544) organizationa requirements for Air Conditioners; 36,000 BTU, Floor Mounting.

TM 5–4120
C

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE
WASHINGTON, D. C., *2 Marc*

Operator, Organizational, DS, GS, and Depot Maintenance Manual AIR CONDITIONER, VERTICAL, COMPACT; FLOOR MOUNTED; 36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING 208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL MAC 6V40–340–2) FSN 4120–935–5421; 208 VOLT, 3 PHASE, 400 CYCLE (TRANE MODEL MAC 4V40–340–3) FSN 4120–935–5418

TM 5–4120–268–15, 7 May 1969, is changed as follows:

Page 2–1, paragraph 2–3. Paragraph *e* is added as follows:

e. Maintenance and operating supplies for initial 8 hours of operation for the ditioner are contained in table 2–1.

Table 2–1. Maintenance and Operating Supplies

(1) Component Application	(2) Federal Stock Number	(3) Description	(4) Quantity Required F/Initial Operation	(5) Quantity Required F/8 Hrs Operation	(6) Notes
		AIR FILTER ADHESIVE			
AIR FILTER	9150–753–4764	Oil, Lubricating Grade –30 1 qt can.	(1)	(1)	(1) Quantity required fo stockage will be de and authorized ba method of applica and frequency req proper servicing.
	4130–860–0042	Coater, Air Filter Adhesive 1 pt container.	(1)	(1)	

Page B–1. Appendix B is superseded as follows:

APPENDIX B

BASIC ISSUE ITEM LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

B–1. Scope

This appendix lists basic issue items, items troop installed or authorized which accompany the air conditioner and are required by the crew/operator for operation, installation, or operator's maintenance.

B–2. General

This basic issue items, items troop installed or authorized list is divided into the following sections:

a. Basic Issue Items List—Secion II. Not applicable.

b. Items Troop Installed or Authorized List—Section III. A list in alphabetical sequence of items which at the descretion of the unit commander may accompany the end item, but are NOT subject to be turned in with the end item.

3. Explanation of Columns

The following provides an explan in the tabular list of Basic Issue tion II, and Items Troop Install Section III.

a. Source, Maintenance, an Code(s) (SMR): Not applicable

b. Federal Stock Number. T cates the Federal stock numbe item and will be used for requisi

c. Description. This column i eral item name and any addit of the item required.

d. Unit of Measure (U/M). phabetic abbreviation indicatin quantity of the item upon whic are based, e.g., ft, ea, pr, etc.

e. Quantity Authorized (Item or Authorized Only). This colu quantity of the item authorized the equipment.

By Order of the Secretary of the Army:

CREIGHTON W. A
General, United Sta
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12–25C, (qty rqr block No. 554) Organizational ma
quirements for Environmental Equipment: air Conditioners, 36,000 BTU, Floor Mounting.

Changes in force: C 1, C 2 and C 3

TM 5-4120
C 3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE
WASHINGTON, D.C., *12 Mar*

Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual AIR CONDITIONER, VERTICAL COMPACT FLOOR MOUNTED, 36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING, 208 VOLT, 3 PHASE, 50/60 CYCLE, TRANE MODEL MAC6V40-340-2, NSN 4120-00-935-5421, 208 VOLT, 3 PHASE, 400 CYCLE, TRANE MODEL MAC4V40-340-3, NSN 4120-00-935-5418

TM 5-4120-268-15, 7 May 1969, is changed as follows:
The title is changed as shown above.
Page 2 of cover. Add the following warning to the list of safety precautions.

WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety and Health of the U.S. Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate. Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this type of environment.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States
Chief of Staff

Official:

Changes in force: C1 thru C4

TM

CHANGE
No. 4

HEADQUARTE
DEPARTMENT OF THE
WASHINGTON, D.C., 7 Ma

Operator's Organizational, Direct Support, General Support and Depot Maintenance Manual
AIR CONDITIONER, VERTICAL COMPACT FLOOR MOUNTED, 36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING, 208 VOLT, 3 PHASE, 50/6 CYCLE, TRANE MODEL MAC6V40-340-2, NSN 4120-00-935-5421, 208 VOLT 3 PHASE, 400 CYCLE, TRANE MODEL MAC4V40-340-3, NSN 4120-00-935-5418

TM 5-4120-268-15, 7 May 1969, is changed as follows:

Page 2-6, paragraph 2-11. Add the following caution before subparagraph a:

CAUTION

To prevent refrigerant from condensing in crankcase and mixing with the oil, do not start unit in air condition mode of operation until power has been applied to unit for 4 hours.

By Order of the Secretary of the Army:

E. C. MEYER
General, United States A
Chief of Staff

Official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

TECHNICAL MANUAL

No. 5–4120–268–15

HEADQUA
DEPARTMENT OF
WASHINGTON, D. C

OPERATOR, ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUA

AIR CONDITIONER: VERTICAL COMPACT, FLOOR MOUNTE 36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING; 208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL MAC6V40–340–2) FSN 4120–935–5421, 208 VOLT, 3 PHASE, 400 CYCLE, (TRANE MODEL MAC4V40–340–3) FSN 4120–935–5418

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1–1. Scope

a. This manual is published for use of personnel to whom Military Models MAC4V40–340–3 and MAC6V40–340–2 air conditioners are issued. Chapters 1 through 3 provide information on operation, preventive maintenance services, and organizational maintenance of the equipment, accessories, components, and attachments. Chapters 4 through 6 provide instructions for direct and general support and depot maintenance. Also included are description of main units and their relationship to other components.

b. Appendix A contains a list of reference publications applicable to this manual. Appendix B contains the list of Basic Issue Items authorized the operator of this equipment. The Organizational, Direct and General Support, and Depot Maintenance Repair Parts and Special Tools are listed and illustrated in TM 5–4120–268–25P (when printed). Appendix C contains the Maintenance Allocation Chart.

c. Numbers in parentheses on illustrations indicate quantity. Numbers preceding nomenclature callouts on illustrations i
ferred maintenance sequence.

d. Report of errors, omissions
dations for improving this pu
individual user is encouraged. F
submitted on DA Form 2028
Changes to DA Publications) a
rect to the Commanding Gene
Mobility Equipment Com
AMSME-MPP, 4300 Goodfellov
Louis, Mo. 63120.

e. Report all equipment imp
mendations as prescribed by T

1–2. Record and Report Forms

a. DA Form 2258 (Depreser
Engineer Equipment).

b. For other record and repo
ble to the operator and organ
nance, refer to TM 38–750.

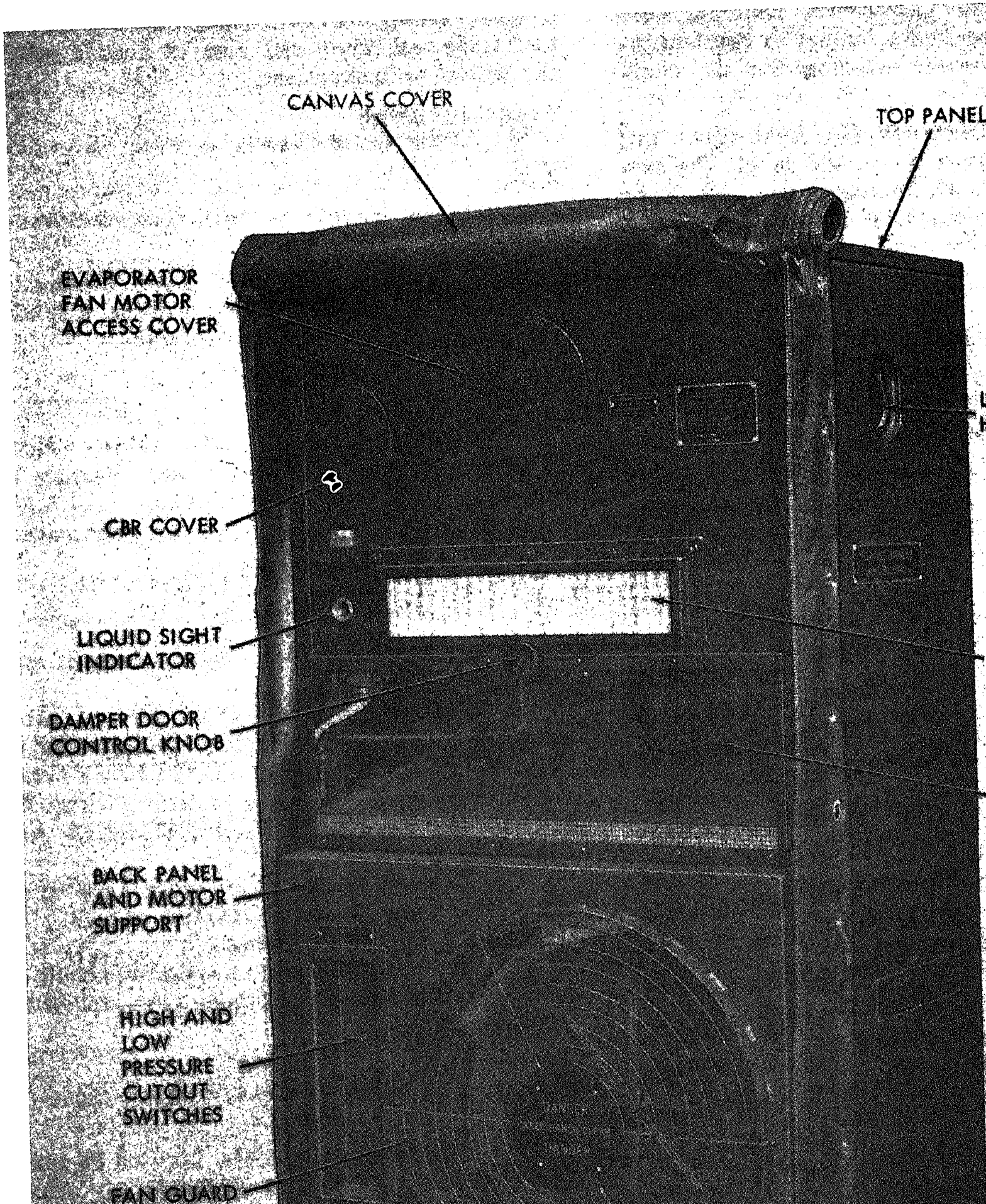
Note. Applicable forms, excludi
46 (United States Government Mot
tor's Identification Card) which is c
ator, will be kept in a canvas ba
equipment.

Section II. DESCRIPTION AND TABULATED DATA

1–3. Description

b. Condensing Section. The


CONTROL PANEL


CANVAS COVER
TOP PANEL
EVAPORATOR FAN MOTOR ACCESS COVER
CBR COVER
LIQUID SIGHT INDICATOR
DAMPER DOOR CONTROL KNOB
BACK PANEL AND MOTOR SUPPORT
HIGH AND LOW PRESSURE CUTOUT SWITCHES
FAN GUARD

valve, solenoid valve, electrical heaters, sight glass, accumulators, and a damper to regulate the amount of outdoor air entering the air conditioner.

d. Locational References. The front of the unit is the face containing the control panel. The condenser fan grille is at the rear of the unit. Right and left are determined by facing the front of the unit in the operator's position when operating the controls.

1-4. Identification and Tabulated Data

a. Identification. The air conditioner has 14 major identification plates. The information contained on the plates is listed below.

(1) *Military identification plate.* Located near top of rear panel, contains the following information. Information listed is for the MAC-6V40 air conditioner.

U.S. ARMY
AIR CONDITIONER, VERTICAL
COMPACT, 36,000 BTU/HR
208 VOLT, 3 PHASE, 60 CYCLE
FSN 4120-935-5421
PART NO. 97403-13214E3900
MFD BY THE TRANE CO.
CONTRACT NO.
DATE
SERIAL NO.—WT 460 lb.

The MAC4V40 plate contains the same information with the following exceptions.

400 CYCLE
FSN 4120-935-5418
PART NO. 97403-13214E4000
WT 455 lbs.

(2) *Liquid sight indicator color change plate.* Located on rear panel above liquid sight indicator (fig. 1-2) contains the following information:

DRY (green band) CAUTION (chartreuse band)

(5) *Damper control plate.* trol knobs on front and rear the following instructions.

FRESH AIR DOOR
OPEN (arrow counterclockwise on rear)
TURN
CLOSE (arrow clockwise on front, rear).

(6) *Cutout switch reset p* lower rear panel above reset b the following resetting instruct

HP CUTOUT PUSH TO RESET

(7) *Power supply plate* mounted near power connection cations at front rear and sides o 6V40 plate contains the follow

POWER SOURC
208 VOLTS, 3 PHA
60 CYCLES

The MAC4V40 plate is the sar cifies 400 CYCLES.

(8) *Control panel instructi* on the front of the control panel PERATURE INCREASE and DE and selector switch function con HEAT, LO HEAT, OFF, VE COOL. See figure 2-1.

(9) *Circuit breaker access* lower front panel, indicates loca BREAKER ACCESS opening.

(10) *Fan warning plate.* Loc condenser fan guard, contain warning:

DANGER
KEEP HANDS CLE
DANGER

(11) *Wiring diagram plate.*

b. Tabulated Data.

(1) *Air conditioner, compact, vertical, self-contained.*

Manufacturer ..... The Trane Company
Models ..... MAC4V40–340–3 and MAC6V40–340–2
Capacity:
  Cooling ..... 36,000 BTU/HR
  Heating:
    60 cycles ..... 30,000 BTU/HR
    400 cycles ..... 33,000 BTU/HR
  Ventilating ..... 1,300 CFM

(2) *Condensing section.*

(*a*) *Compressor.*

Manufacturer ..... The Trane Company
Model MJ4
Type ..... Hermetically sealed, reciprocating
Part Number:
  MAC4V40–340–3 ..... A4525–740–5
  MAC6V40–340–2 ..... A4525–740–4

(*b*) *Condensing coil.*

Manufacturer ..... The Trane Company
Type ..... Finned tube
Part number A4525–682

(*c*) *Condenser fan.*

Manufacturer ..... The Trane Company
Type ..... Axial
Part number ..... FAN 297

(*d*) *Condenser fan motor.*

Manufacturer ..... Welco Industries, Inc.
Type ..... Induction, direct drive
Part number:
  MAC4V40–340–3 7025–6
  MAC4V60–340–2 7015–4

(*e*) *Dehydrator.*

Manufacturer ..... Sporlan Valve Co.
Type ..... Dessicant drier
Part number C164

(*f*) *Pressure relief valve.*

Manufacturer ..... Superior Valve & Fitting

(*i*) *Low pressure cutout*

Manufacturer ..... Penn Cont
Type ..... Pressure c closed
Part number 210AP10A

(*j*) *System access valves.*

Manufacturer ..... Superior V Co.
Type ..... Diaphragm
Part number 5939X4
Number per unit 2

(3) *Evaporator section.*

(*a*) *Evaporator coil.*

Manufacturer ..... The Trane
Type ..... Finned Tu
Part number A4525–668

(*b*) *Evaporator fans.*

Manufacturer ..... The Trane
Type ..... Centrifuga
Part number ..... FAN 296 (183 (RH
Number per unit 2

(*c*) *Evaporator fan motor*

Manufacturer ..... Welco Indu
Type ..... Induction, double e
Part number:
  MAC4V40–340–3 4715–22
  MAC6V40–340–2 926303

(*d*) *Air filters.*

Manufacturer ..... Edco Sales
Alternate ..... Farr Co.
Type ..... Permanent
Part number:
  Return air AL–18–4–
  Fresh air AL–27.88–
Alternate:
  Return air A31547–1
  Fresh air A31547–2
Number per unit ..... 1 each

(*e*) *Expansion valves.*

Number per unit 6

(h) Sight glass.

Manufacturer ..... Sporlan Valve Co.
Type ..... Bulls-eye
Part number SAK16

(4) *Electrical controls.*

(a) Temperature control thermostat.

Manufacturer ..... Penn Controls, Inc.
Type ..... Bimetallic element, normally closed
Part number A19AGF-9

(b) Selector switch.

Manufacturer ..... Cutler-Hammer, Inc.
Type ..... Rotary, five-position
Part number 8912K216

(c) Heater thermostatic switch.

Manufacturer ..... Metals and Controls, Inc.
Type ..... Automatic reset, normally closed
Part number CWA1249

(d) Magnetic contactors.

Manufacturer	Cutler-Hammer, Inc.	
Type	Three-pole, single throw	
Load capacity	50 amperes	25 amperes
Part number	9565H94	9565H2B
Number per unit	1	3

(e) Time delay relay.

Manufacturer ..... Dialtron Corp.
Type ..... Thermal delay, normally open
Part number FR-305-NO-24

(f) Circuit breaker, MAC4V40-340-3.

Manufacturer ..... Heinemann Electric Co.
Type ..... Manual reset
Part number 71-212-5MG6

(g) Circuit breaker, MAC6V40-340-2.

Manufacturer ..... Heinemann Electric Co.
Type ..... Manual reset
Part number 71-212-4MG6

(h) Fuses.

Manufacturer ..... Bussman Mfg. Co.

(k) Rectifier.

Manufacturer ..... Syntr
Type ..... Silico
Part number SS02

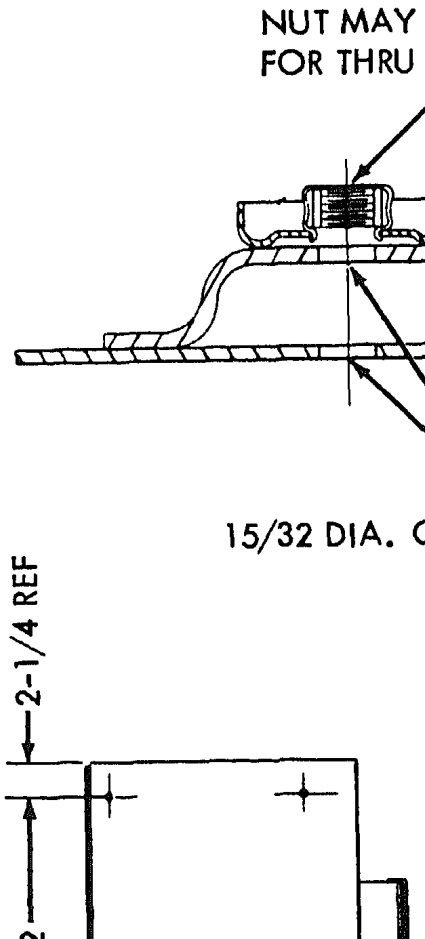
(l) RFI Filters.

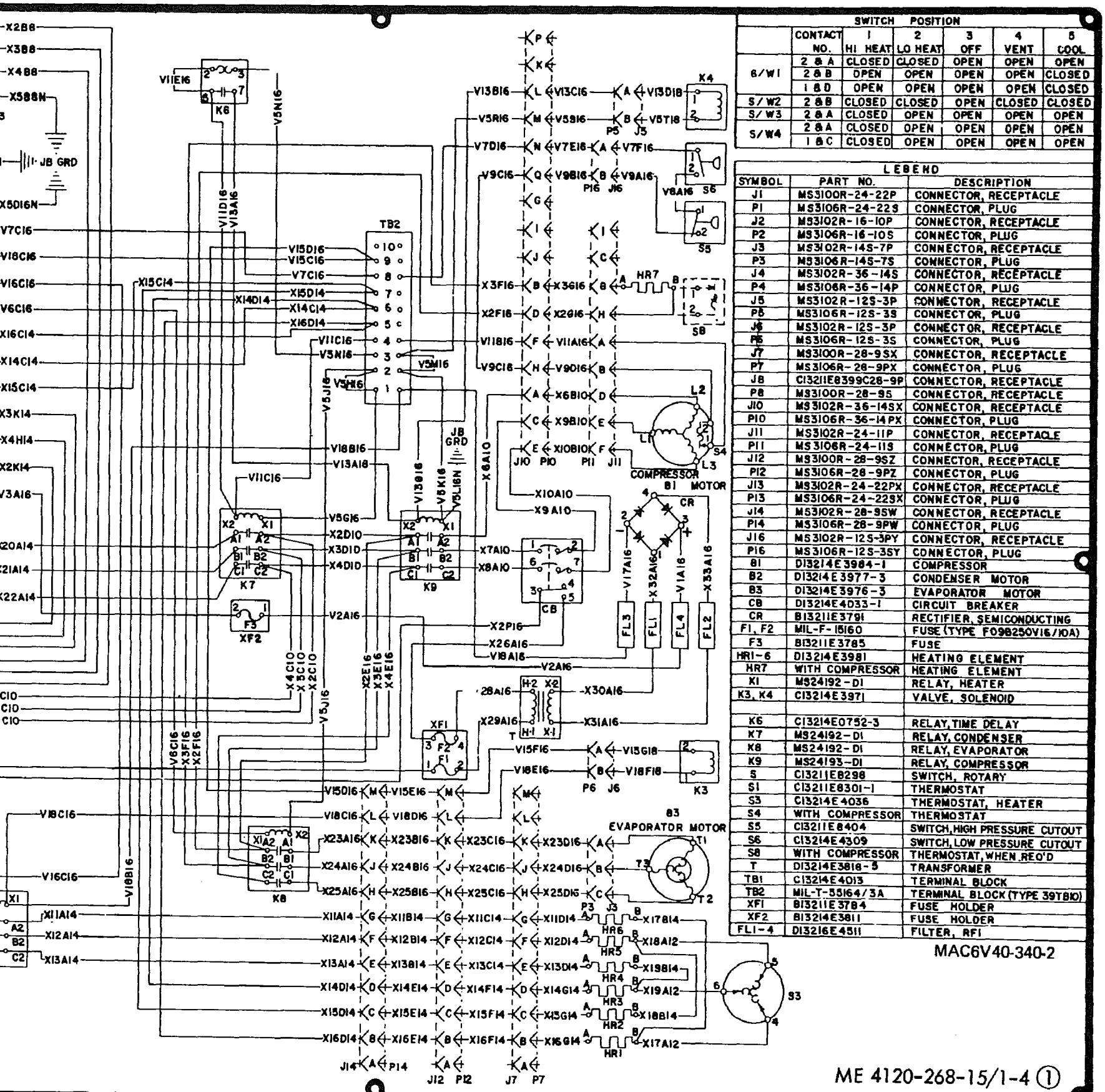
Manufacturer ..... Sprag
Part number 5JX1
Number per unit 4

(5) *Dimensions and we*

Length 21 5/
Width 30 5/
Height ..... 55 inc
Weight:
MAC4V40-340-3 ..... 455 p
MAC6V40-340-2 ..... 460 p

(6) *Base plan.* Refer to plan.





SWITCH POSITION						
	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/W1	2 & A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	2 & B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1 & D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/W2	2 & B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/W3	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/W4	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
	1 & C	CLOSED	OPEN	OPEN	OPEN	OPEN

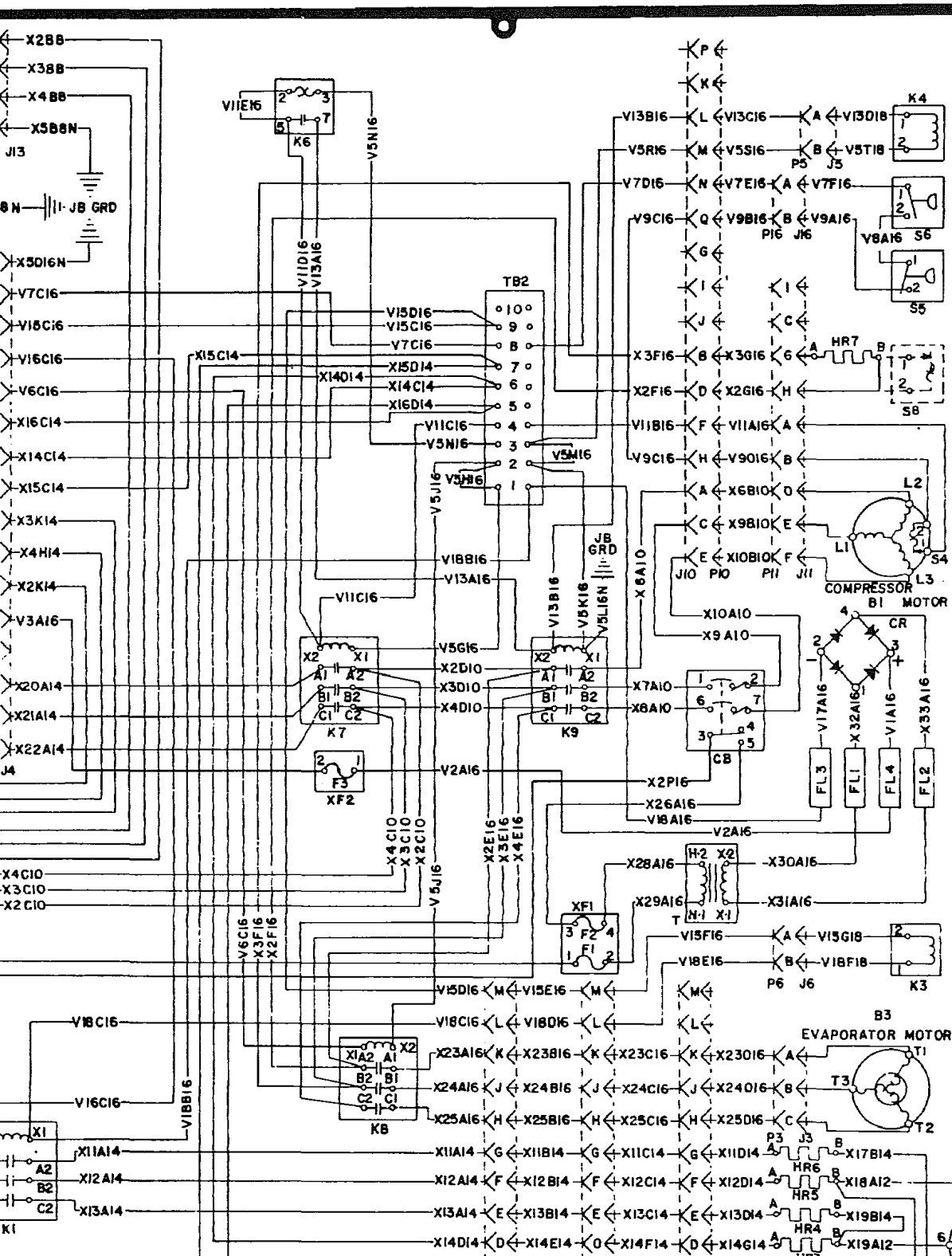
LEGEND

SYMBOL	PART NO.	DESCRIPTION
J1	MS3100R-24-22P	CONNECTOR, RECEPTACLE
P1	MS3106R-24-22S	CONNECTOR, PLUG
J2	MS3102R-16-10P	CONNECTOR, RECEPTACLE
P2	MS3106R-16-10S	CONNECTOR, PLUG
J3	MS3102R-14S-7P	CONNECTOR, RECEPTACLE
P3	MS3106R-14S-7S	CONNECTOR, PLUG
J4	MS3102R-36-14S	CONNECTOR, RECEPTACLE
P4	MS3106R-36-14P	CONNECTOR, PLUG
J5	MS3102R-12S-3P	CONNECTOR, RECEPTACLE
P5	MS3106R-12S-3S	CONNECTOR, PLUG
J6	MS3102R-12S-3P	CONNECTOR, RECEPTACLE
P6	MS3106R-12S-3S	CONNECTOR, PLUG
J7	MS3100R-28-9SX	CONNECTOR, RECEPTACLE
P7	MS3106R-28-9PX	CONNECTOR, PLUG
J8	CI3211E8399C28-9P	CONNECTOR, RECEPTACLE
P8	MS3100R-28-9S	CONNECTOR, RECEPTACLE
J10	MS3102R-36-14SX	CONNECTOR, RECEPTACLE
P10	MS3106R-36-14PX	CONNECTOR, PLUG
J11	MS3102R-24-11P	CONNECTOR, RECEPTACLE
P11	MS3106R-24-11S	CONNECTOR, PLUG
J12	MS3100R-28-9SZ	CONNECTOR, RECEPTACLE
P12	MS3106R-28-9PZ	CONNECTOR, PLUG
J13	MS3102R-24-22PX	CONNECTOR, RECEPTACLE
P13	MS3106R-24-22SX	CONNECTOR, PLUG
J14	MS3102R-28-9SW	CONNECTOR, RECEPTACLE
P14	MS3106R-28-9PW	CONNECTOR, PLUG
J16	MS3102R-12S-3PY	CONNECTOR, RECEPTACLE
P16	MS3106R-12S-3SY	CONNECTOR, PLUG
B1	DI3214E3984-1	COMPRESSOR
B2	DI3214E3977-3	CONDENSER MOTOR
B3	DI3214E3976-3	EVAPORATOR MOTOR
CB	DI3214E4033-1	CIRCUIT BREAKER
CR	BI3211E3791	RECTIFIER, SEMICONDUCTING
F1, F2	MIL-F-15160	FUSE (TYPE FO98250V16/10A)
F3	BI3211E3785	FUSE
HR1-6	DI3214E3981	HEATING ELEMENT
HR7	WITH COMPRESSOR	HEATING ELEMENT
K1	MS24192-D1	RELAY, HEATER
K3, K4	CI3214E3971	VALVE, SOLENOID
K6	CI3214E0752-3	RELAY, TIME DELAY
K7	MS24192-D1	RELAY, CONDENSER
K8	MS24192-D1	RELAY, EVAPORATOR
K9	MS24193-D1	RELAY, COMPRESSOR
S	CI3211E8298	SWITCH, ROTARY
S1	CI3211E8301-1	THERMOSTAT
S3	CI3214E4036	THERMOSTAT, HEATER
S4	WITH COMPRESSOR	THERMOSTAT
S5	CI3211E8404	SWITCH, HIGH PRESSURE CUTOUT
S6	CI3214E4309	SWITCH, LOW PRESSURE CUTOUT
S8	WITH COMPRESSOR	THERMOSTAT, WHEN REQ'D
T	DI3214E3818-5	TRANSFORMER
TB1	CI3214E4013	TERMINAL BLOCK
TB2	MIL-T-55164/3A	TERMINAL BLOCK (TYPE 39TB10)
XF1	BI3211E3784	FUSE HOLDER
XF2	BI3214E3811	FUSE HOLDER
FL1-4	DI3216E4511	FILTER, RFI

MAC6V40-340-2

ME 4120-268-15/1-4 ①

TM 5-4120



SWITCH POSITION						
	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/W1	2 & A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	2 & B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1 & D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/W2	2 & B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/W3	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/W4	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
	1 & C	CLOSED	OPEN	OPEN	OPEN	OPEN

LEGEND		
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J3	MS3102R-14S-7P	CONNECTOR, RECEPTACLE
P3	MS3106R-14S-7S	CONNECTOR, PLUG
J4	MS3102R-36-14S	CONNECTOR, RECEPTACLE
P4	MS3106R-36-14P	CONNECTOR, PLUG
J5	MS3102R-12S-3P	CONNECTOR, RECEPTACLE
P5	MS3106R-12S-3S	CONNECTOR, PLUG
J6	MS3102R-12S-3P	CONNECTOR, RECEPTACLE
P6	MS3106R-12S-3S	CONNECTOR, PLUG
J7	MS3100R-28-9SX	CONNECTOR, RECEPTACLE
P7	MS3106R-28-9PX	CONNECTOR, PLUG
J8	CI32IIE8399C28-9P	CONNECTOR, RECEPTACLE
P8	MS3100R-28-9S	CONNECTOR, RECEPTACLE
J10	MS3102R-36-14SX	CONNECTOR, RECEPTACLE
P10	MS3106R-36-14PX	CONNECTOR, PLUG
J11	MS3102R-24-11P	CONNECTOR, RECEPTACLE
P11	MS3106R-24-11S	CONNECTOR, PLUG
J12	MS3100R-28-9SZ	CONNECTOR, RECEPTACLE
P12	MS3106R-28-9PZ	CONNECTOR, PLUG
J13	MS3102R-24-22PX	CONNECTOR, RECEPTACLE
P13	MS3106R-24-22SX	CONNECTOR, PLUG
J14	MS3102R-28-9SW	CONNECTOR, RECEPTACLE
P14	MS3106R-28-9PW	CONNECTOR, PLUG
J16	MS3102R-12S-3PY	CONNECTOR, RECEPTACLE
P16	MS3106R-12S-3SY	CONNECTOR, PLUG
B1	DI3214E3984-2	COMPRESSOR
B2	DI3214E3977-4	CONDENSER MOTOR
B3	0I3214E3976-4	EVAPORATOR MOTOR
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XF1	BI3211E3784	FUSE HOLDER
XF2	BI3214E3811	FUSE HOLDER
FL1-4	DI3218E4911	FILTER, RFI

MAC4V40-340-3

(7) *Wiring diagrams.* Refer to figure 1–4 for wiring diagrams.

(8) *Schematic wiring diagram.* Refer to figure 1–5 for schematic wiring.

1–5. Difference in Models

This manual covers the Trane MAC4V40–340–3 and MAC6V40–340–2 air conditioners. The differences between the two air conditioners are in the electrical system. Model MA designed to operate from a 40(3 phase supply. Model MAC6V signed to operate from a 50/6(3 phase supply. Where differe model is covered separately in a nance section of this manual.

Figure 1–5. Schematic wirin
(Located in back of m

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2–1. Unloading the Equipment

a. Remove any blocking or tiedowns that may have been used to secure the item to carrier. The air conditioner is shipped in a wooden carton, the base of which is raised to provide for insertion of tongs of a fork.

b. Use a forklift or other suitable lifting device to remove unit from carrier.

Caution: **Use care in handling to avoid damaging the air conditioner.**

2–2. Unpacking the Equipment

a. General. Move air conditioner to installation site before removing shipping container. Cut the metal bands and remove top, end, and sides of carton, and the covering. Remove bolts securing base of unit to crate. Using a suitable hoist or crane and a spreader bar attached to the lifting handles, lift unit from crate.

b. Depreservation. Prior to placing unit in operation, accomplish depreservation in accordance with instructions outlined in DA Form 2258 (Depreservation Guide of Engineer Equipment). DA Form 2258 is attached on or near the operational controls.

2–3. Inspecting and Servicing Equipment

a. Perform daily preventive maintenance serv-

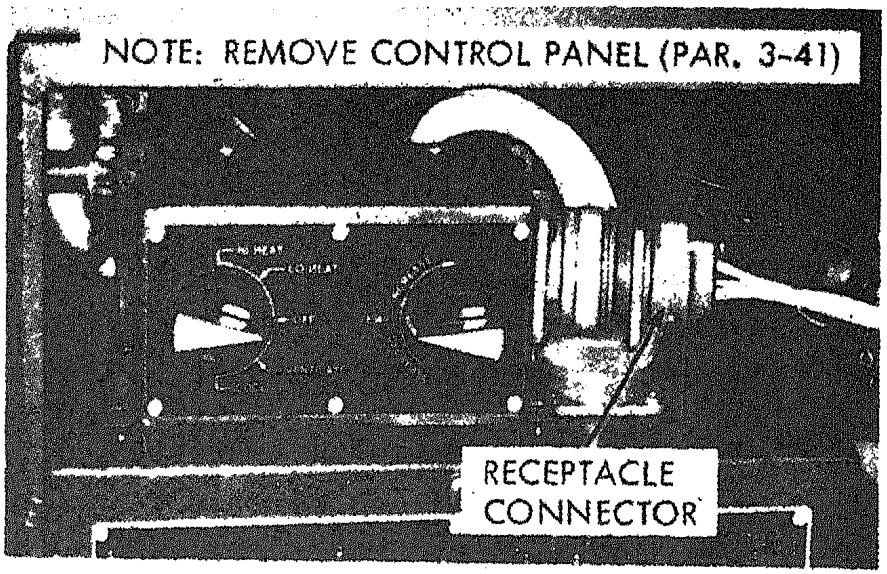
tions it may become desirable to
panel in a remote location and
control blockoff plate.

b. Blockoff Plate. The block
vided for installation when the
moved for remote control oper
off plate provided must be use
will enter the lower compartme
ure 2–1, and install the blocko

2–5. Installation or Setting-Up

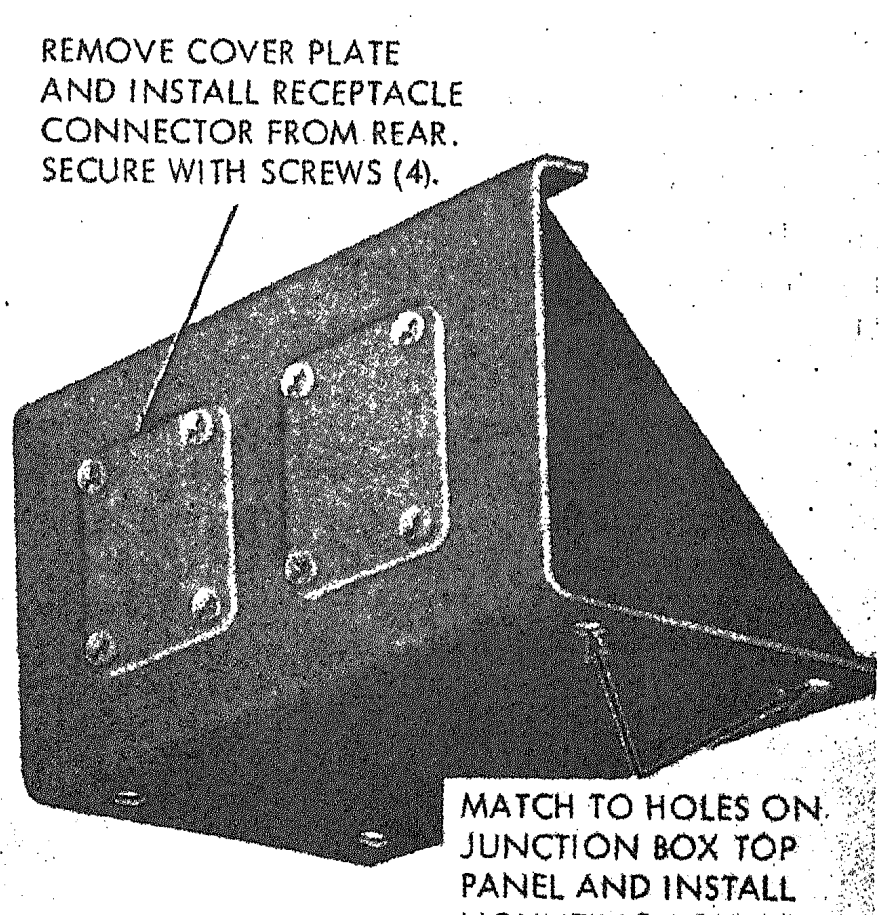
a. General. Set air conditione
tion to allow proper condensat
ation will be satisfactory with
slight angle, and using one
drain connections).

b. Locating the Unit. The
front panel and evaporator fan
take grilles must be accessible f
and maintenance. The condense
discharge openings must always
to allow sufficient air for cond
The evaporator fan discharge
ings at front of unit should be f
tion to permit maximum unit ca
headroom must be allowed for
eliminator.



NOTE: CONNECT CONTROL PANEL AND RECEPTACLE CONNECTOR WITH SUITABLE CABLE.

NOTE: AN ALTERNATE REMOTE CONTROL CONNECTION OPENING IS LOCATED IN THE LOWER REAR PANEL.



d. Power Source.

(1) *Model MAC4V40–3.*
208 volt, 400 cycle, 3 phase

(2) *Model MAC6V40–3.*
208 volt, 50/60 cycle, 3 phas

(3) *Power receptacle c*
3100R24–22P receptacle is lo
of the unit, at the top of the
Connect the proper electri
source to this receptacle using
plug or acceptable alternate.
power connections are provide
rear of the unit; any locatio
interchanging the power rec
unit and one of the cover pl
rear of the unit. Be sure to
over unused location at front
air from being drawn through

e. Remote Control.

(1) *General.* The control
moved from the unit and use
trol for operation of the air c
mote control connection and
vided must be used when th
used as a remote control.

(2) *Remote control conn*

(*a*) Disconnect power s

(*b*) Refer to figure 2-
remote control connection.

truck or dolly using the recessed handles at sides of unit. Move unit to new worksite.

Note. Use a spreader bar whenever unit is hoisted with a crane.

c. Long Distance Movement. Crate the air conditioner, providing adequate protection to grilles and control panel. Provide suita tie-downs to prevent unit from transfer.

2–7. Reinstallation After Move

Reinstall the air conditioner as i graph 2–5.

Section III. CONTROLS AND INSTRUMENTS

2–8. General

This section describes, locates, illustrates, and furnishes the operator, crew or organizational maintenance personnel sufficient information about the various controls and instruments for proper operation of the air conditioner.

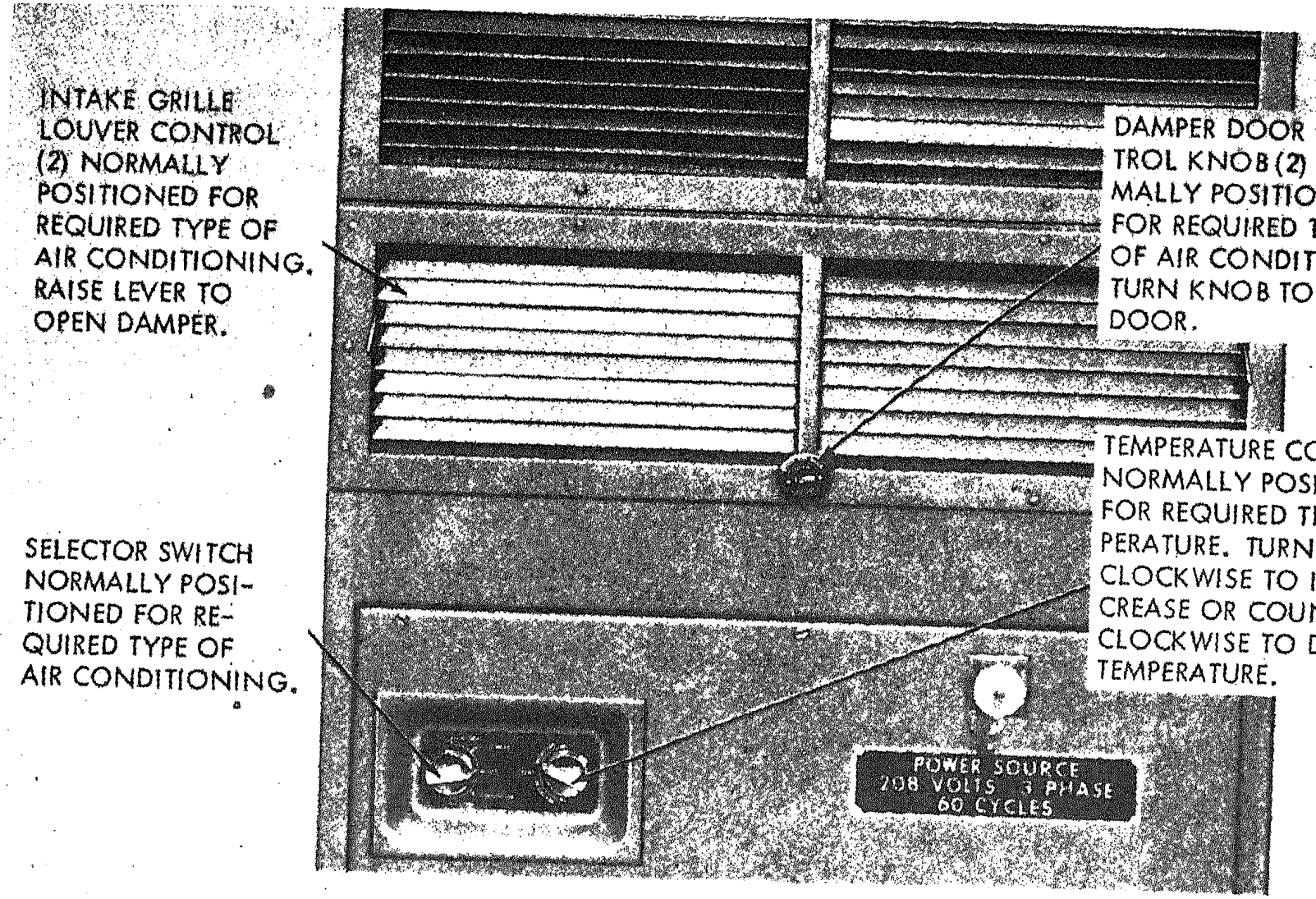
2–9. Controls and Instruments

a. Controls and Instruments. The controls and instruments on the air conditioner are illustrated on figure 2–2.

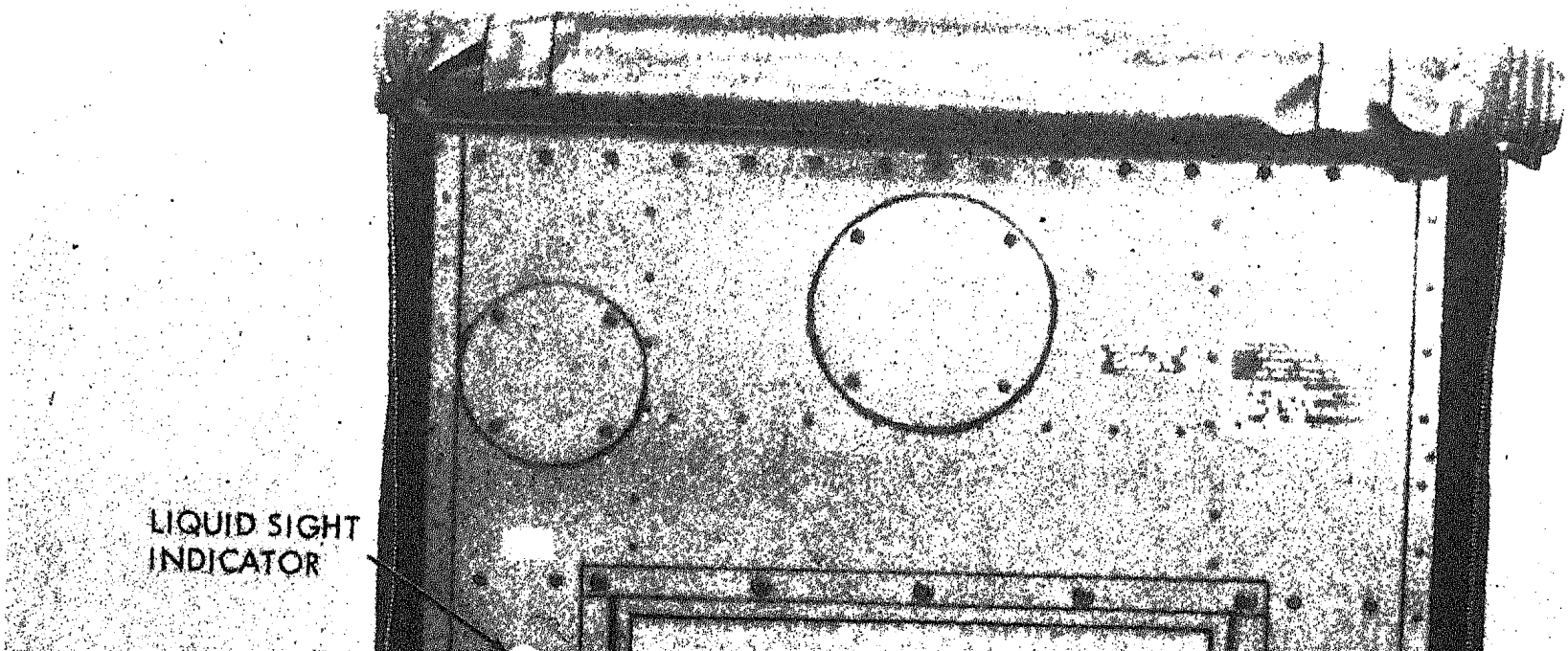
b. High Pressure Cutout Control. The high pressure cutout located at the rear of the unit is designed to sense discharge line pressure at the compressor and will cutout at 445 psig (pounds per square inch gage). When discharge line pressure has reduced to 400 psi, th cutout control can be reset by p button (fig. 2–2).

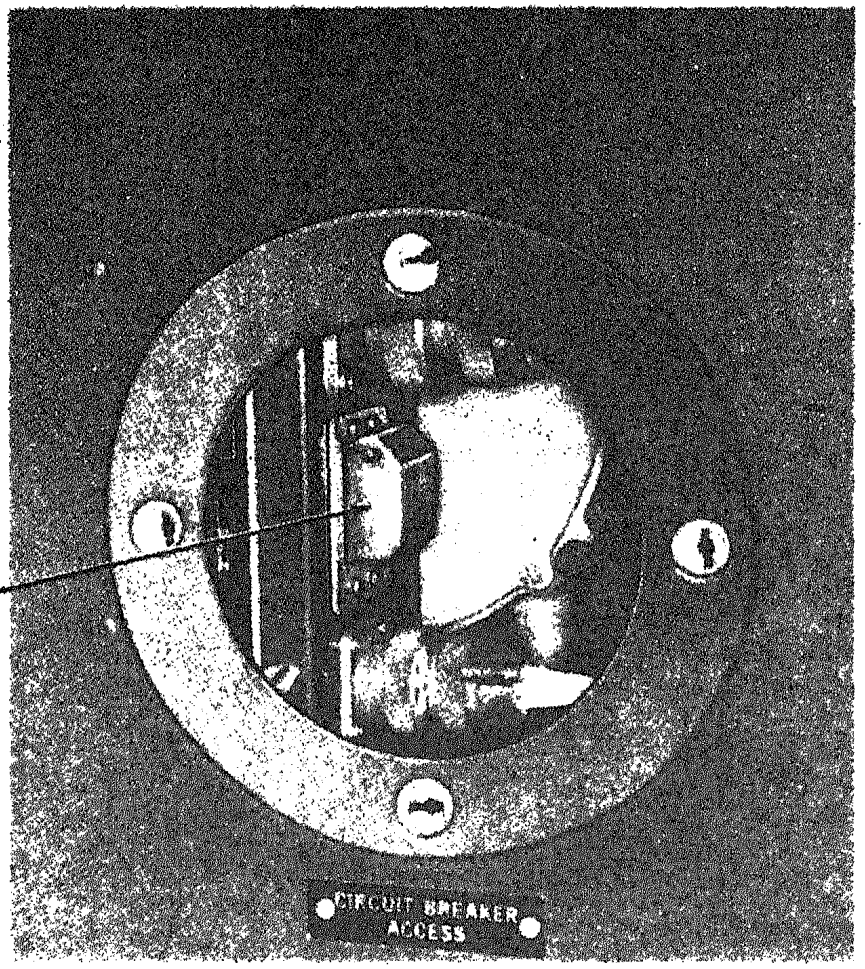
c. Low Pressure Cutout Contr sure cutout located at the rear c signed to sense suction line pres pressor and will cutout at 7 psi line pressure has increased abo low pressure cutout control can ing the reset button (fig. 2–2).

d. Liquid Sight Indicator. The dicator (fig. 2–2) indicates dryne Moisture in the refrigerant is sh cator turning from green to ye of refrigerant is indicated by bu cator.


INTAKE GRILLE LOUVER CONTROL (2) NORMALLY POSITIONED FOR REQUIRED TYPE OF AIR CONDITIONING. RAISE LEVER TO OPEN DAMPER.
DAMPER DOOR
TROL KNOB (2)
MALLY POSITIO
FOR REQUIRED
OF AIR CONDIT
TURN KNOB TO
DOOR.
TEMPERATURE CO
NORMALLY POSI
FOR REQUIRED T
PERATURE. TURN
CLOCKWISE TO
CREASE OR COU
CLOCKWISE TO D
TEMPERATURE.
SELECTOR SWITCH NORMALLY POSITIONED FOR REQUIRED TYPE OF AIR CONDITIONING.
POWER SOURCE
208 VOLTS 3 PHASE
60 CYCLES

A

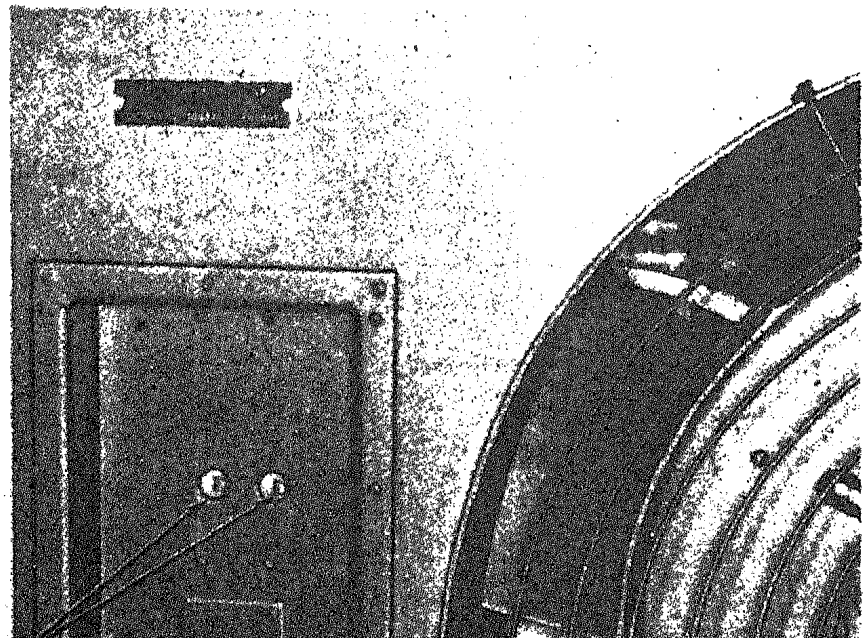

LIQUID SIGHT INDICATOR



NOTE: MOVE
POSITI
CIRCUI

NOTE: BEFORE
WAIT 5

C



NOTE: PUSH B
TO RES
AND LO
SURE C

NOTE: BEFORE
WAIT 2

Section IV. OPERATION OF EQUIPMENT

2-10. General

a. The instructions in this section are published for the information and guidance of personnel responsible for operation of the air conditioner.

b. The operator must know how to perform every operation of which the air conditioner is capable. This section gives instru ing, stopping, and operating det conditioner. Since nearly every sents a different problem, the ope to vary given procedure to fit the Operating control settings are list

Table 2-1. Operating Control Settings

Type of air conditioning required	Temperature control setting	Indoor return air louvers	Outdoor air damper	Se sv po
Cooling—100% Recirculated Air	Desired Temperature	Open	Closed	COOL
Cooling—With Fresh Makeup Air	Desired Temperature	Partially * Closed	Open	COOL
Cooling—With Fresh Makeup Air Drawn Through CBR Filter (Outdoor Air Contaminated)	Desired Temperature	Open	Closed	COOL
Heating—100% Recirculated Air	Desired Temperature	Open	Closed	LO-HI HI-HI
Heating—With Fresh Makeup Air	Desired Temperature	Partially * Closed	Open	LO-HI HI-HE
Heating—With Fresh Makeup Air Drawn Through CBR Filter (Outdoor Air Contaminated)	Desired Temperature	Open	Closed	LO-HI HI-HE
Ventilation—Maximum Outdoor Air	Any	Closed	Open	VENT

*Partial closing of the indoor return air louvers causes a greater portion of the total air flow to be drawn from the outside.

2-11. Starting

a. Perform daily preventive maintenance services (para 3-6).

2-13. Air Conditioner Operation

Refer to figure 2-5, for instructio of the air conditioner.

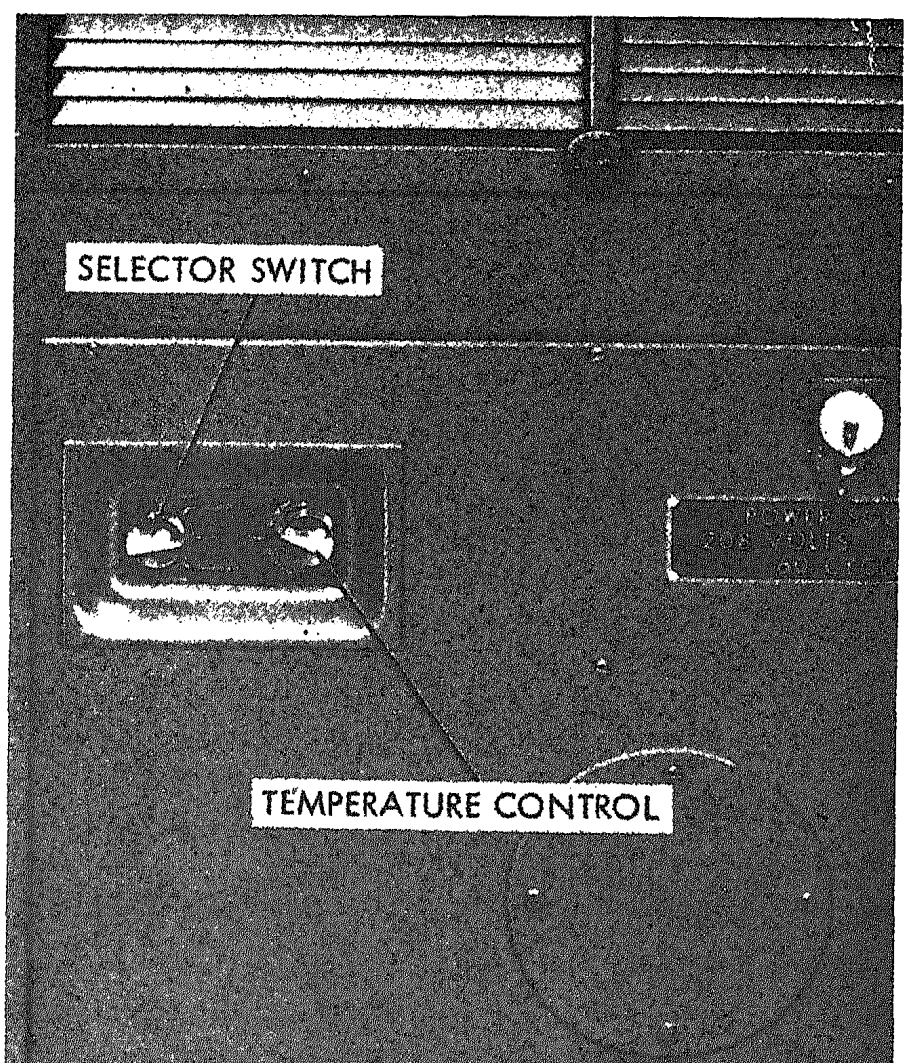


Figure 2–3. Starting instructions.

Caution: **Do not disturb the cold weather unless absolutely n temperatures make wiring and ins and easily broken.**

2–15. Operation in Extreme Hea

a. General. The air conditioner operate satisfactorily at temper 125°F.

b. Ventilation. Allow sufficient the air conditioner for adequate

Note. Do not restrict the flow of and discharge openings of the unit.

2–16. Operation in Dusty or San

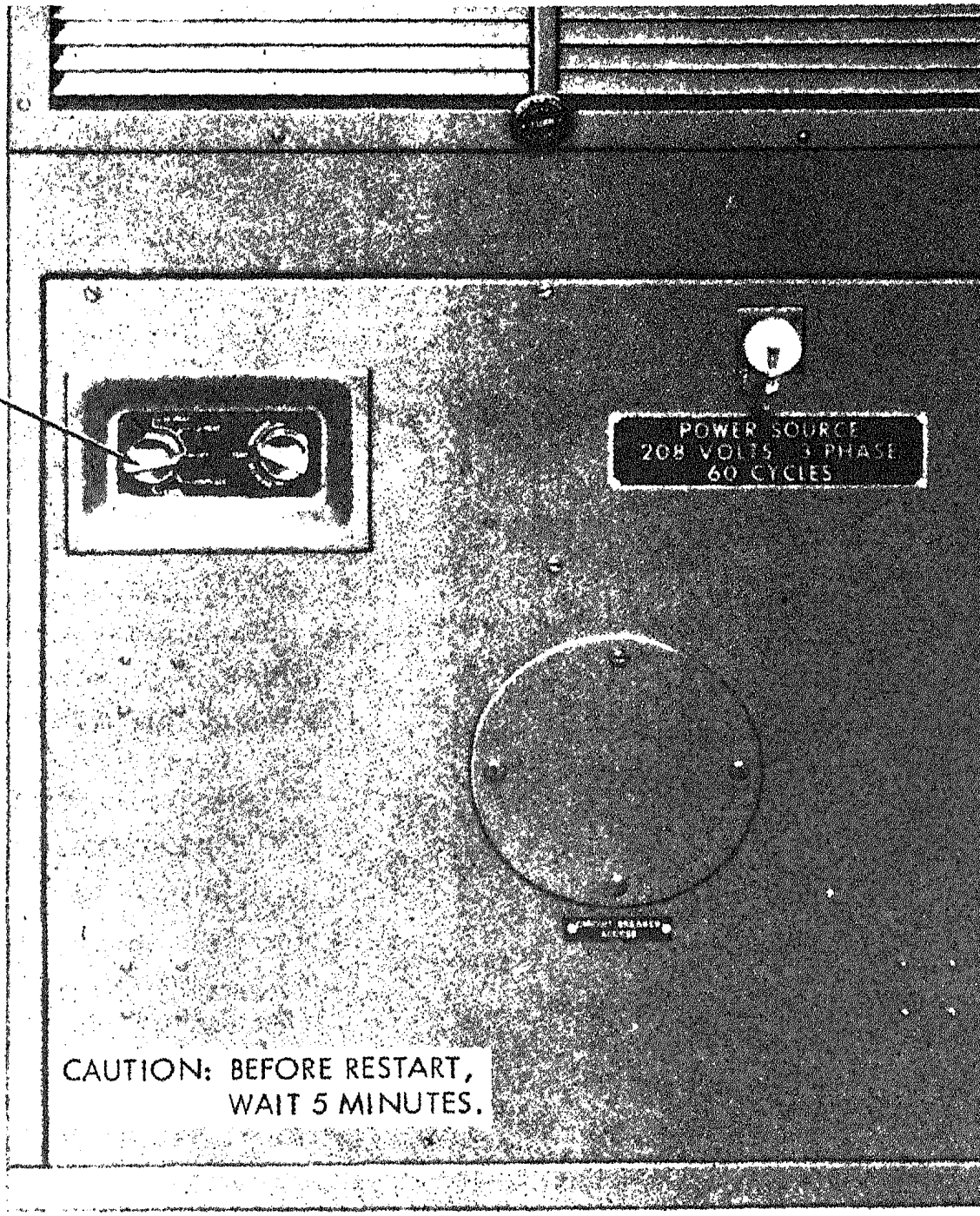
Clean the condenser coil and e weekly or more often if necessary. eliminator, air conditioning filters, filter, and condenser screen daily.

2–17. Operation Under Rainy or Conditions

If the unit is outside and not o dampers and air inlet door. Protect er with the canvas cover (fig. 2–6) ers during dry periods. Open acce covers to allow unit to dry before caution when operating electrical damp or wet areas to avoid shock

2–18. Operation in Salt Water A

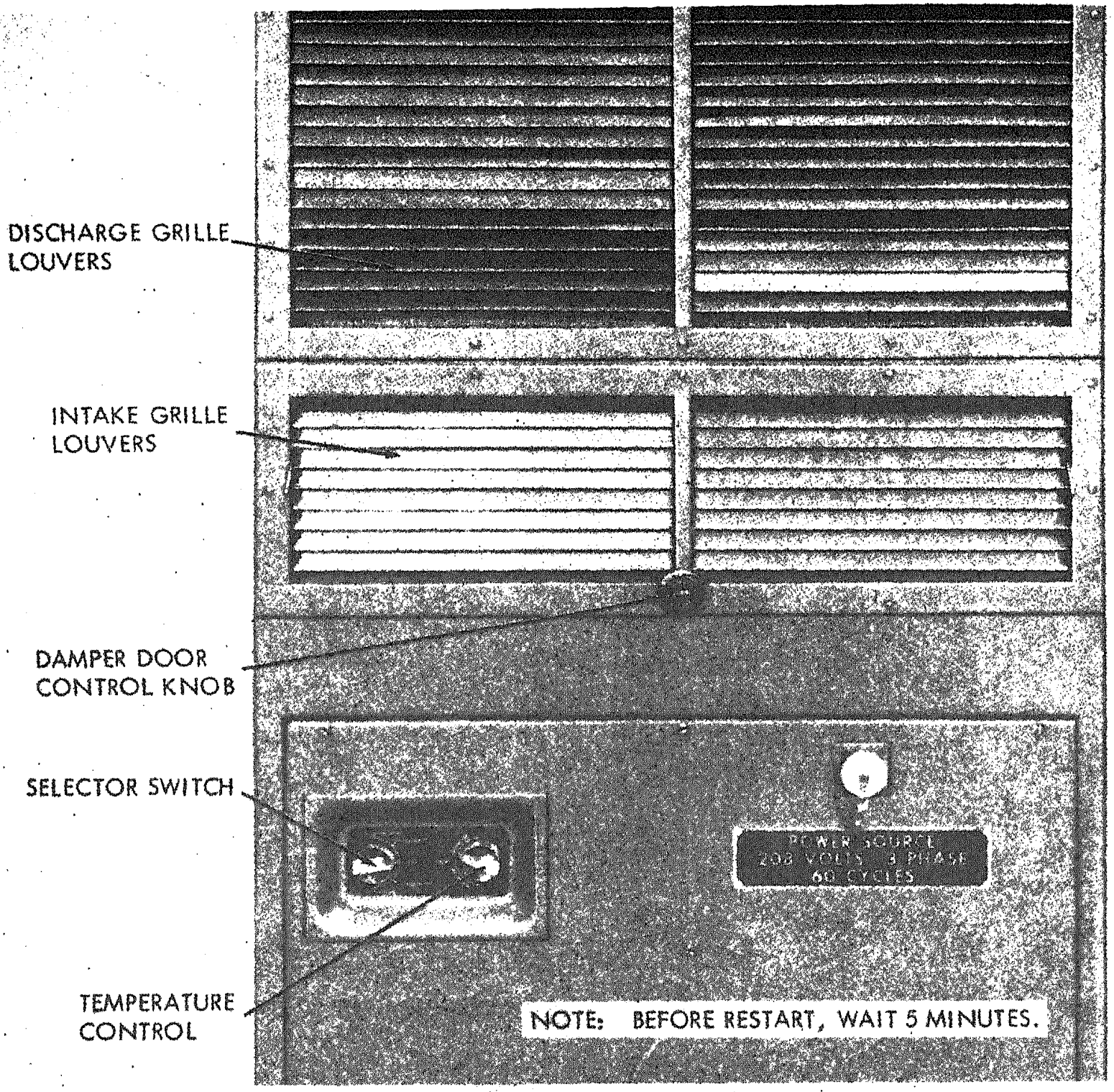
Wash the exterior of the unit wit water at frequent intervals. Do no electrical equipment during the cl tion. Coat exposed metal surfaces w ing material. Remove corrosion and posed metal surface.



CAUTION: TO PREVENT REFRIGERANT FROM CONDENSING IN
CRANKCASE AND MIXING WITH THE OIL, DO NO
DISCONNECT THE UNIT FROM POWER SOURCE DU
ING THE SHUTDOWN PERIOD.

ME

Figure 2-4. Stopping instructions.



A. COOLING OPERATION:

STEP 1. POSITION TEMPERATURE CONTROL FOR DESIRED TEMPERATURE.
STEP 2. ADJUST DISCHARGE GRILLE LOUVERS FOR DESIRED CONDITIONED AIR DELIVERY PATTERN
STEP 3. ADJUST INTAKE GRILLE LOUVERS AND DAMPER DOOR AS INSTRUCTED IN TABLE 2-1.
STEP 4. PLACE SELECTOR SWITCH ON "COOL" POSITION.

B. HEATING OPERATION:


CANVAS COVER

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

3–1. Special Tools and Equipment

No special tools or equipment are required by the operator or organizational maintenance personnel for maintenance of the air conditioner.

3–2. Basic Issue Tools and Equipm

Tools and repair parts issued with for the air conditioner are listed Issue Items List, appendix B of

Section II. LUBRICATION

3–3. General Lubrication Information

The air conditioner fan motors and compressor are lubricated and sealed by the manufacturer. No additional lubrication is required.

3–4. Detailed Lubrication Information

Although the air conditioner requires no lubrication maintenance, operation o dampers will be assisted by period few drops of light oil to all pivot surfaces and linkages. During cold ation clean off all accumulated oi use graphite for lubrication of t lined above.

Section III. PREVENTIVE MAINTENANCE SERVICES

3–5. General

To insure that the air conditioner is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed and described

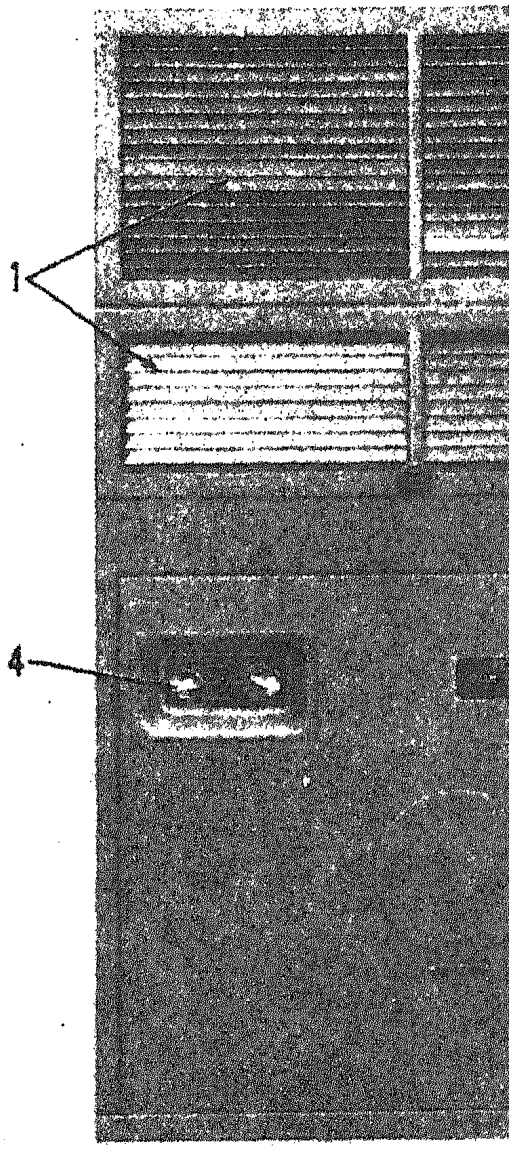
3–6. Daily Preventive Maintenan

This paragraph contains an illustr listing of the preventive mainte which must be performed by the item numbers are listed consecuti cate the sequence of minimum req fer to figure 3–1 for daily preventi services.

PREVENTIVE MAINTENANCE SERVIC

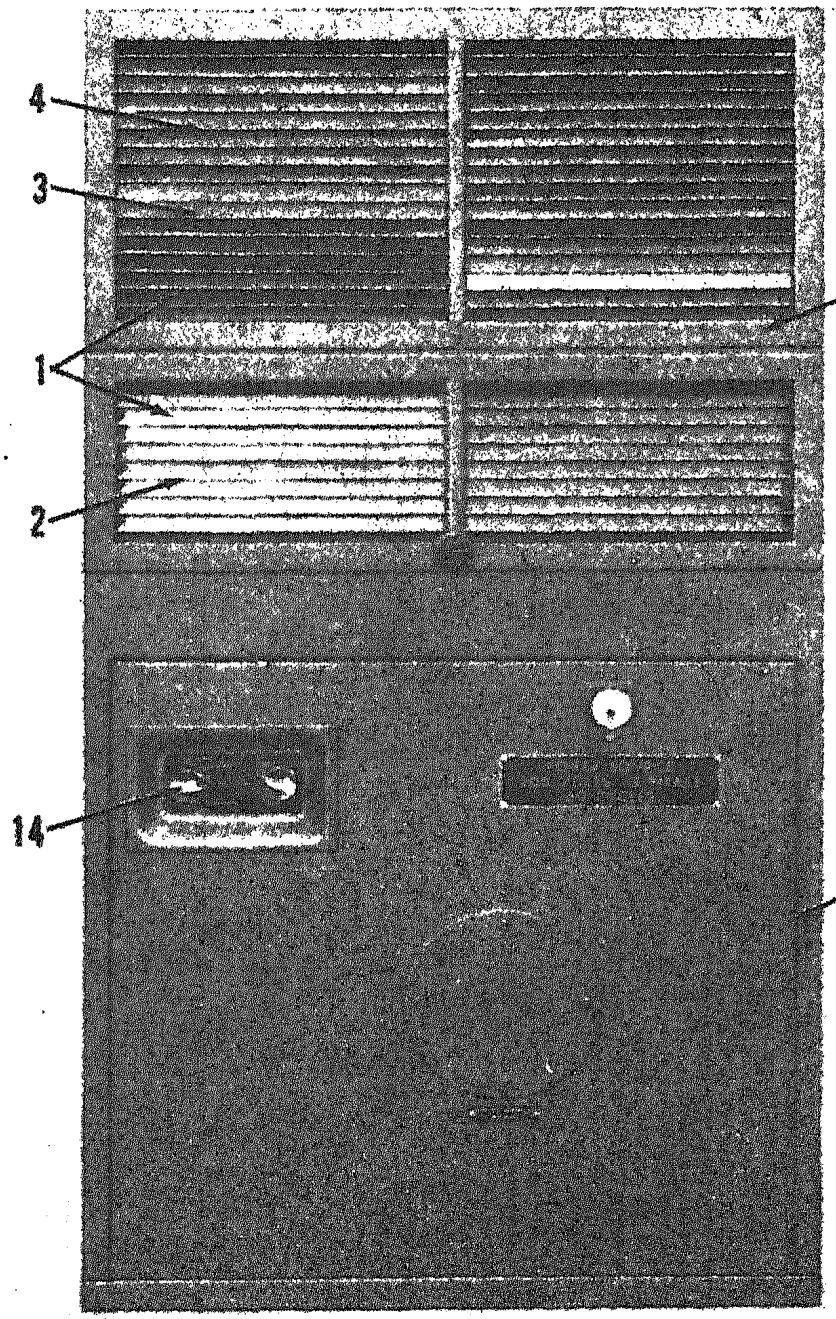
DAILY

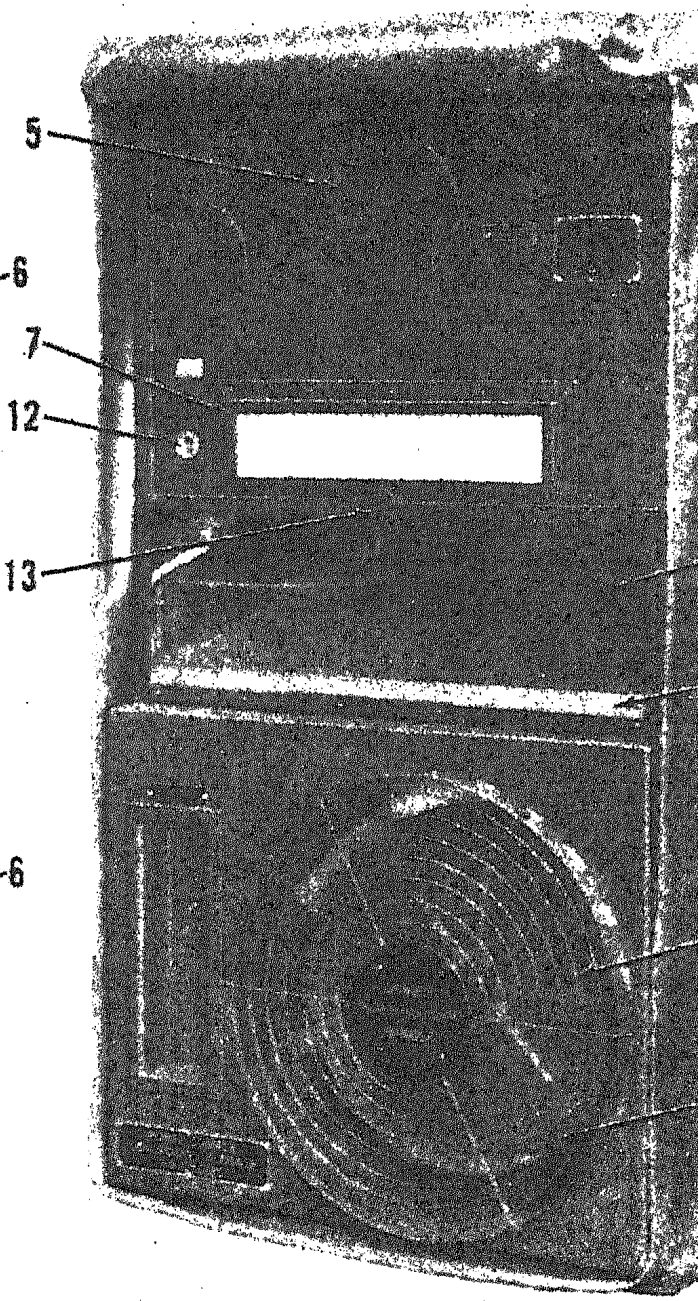
TM 5-4120-268-15 TRANE MODELS MAC4V40-340-3 & MAC6V40-340-2



ITEM

PREVENTIVE MAINTENANCE SERVICES
QUARTERLY





ITEM

ITEM	
5	EVAPORATOR FAN. Clean fan blades. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fans. Replace defective fan.
6	DRAIN PAN AND PIPING. Clean drain pan and drain piping. Inspect check valve for proper operation.
7	FRESH AIR FILTER. Clean fresh air filter.
8	INTAKE SCREEN. Clean condenser intake screen. Tighten loose mounting screws. Replace broken screen.
9	CONDENSER COIL. Clean condenser coil. Tighten loose mounting screws.
10	FAN GUARD. Clean fan guard. Tighten loose mounting screws.
11	CONDENSER FAN. Clean fan blade. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fan blade. Replace defective fan.
12	LIQUID SIGHT INDICATOR. Check for damage or broken glass. Check for full condition of refrigeration system and for mositure in system.
13	DAMPER CONTROL. Check for proper operation. Replace defective parts.
14	CONTROLS. Check for damage and faulty operation. Replace damaged or defective controls.
	NOTE: OPERATION. During operation observe any unusual noise or vibration.

Section IV. OPERATOR'S MAINTENANCE

3–8. General

The instructions in this section are published for the information and guidance of the operator to maintain the air conditioner.

Warning: **Disconnect the air conditioner from the power source before performing any maintenance on the components of this unit.**

3–9. Air Intake and Discharge Grilles

a. General. The intake grille (fig. 1–1) is an adjustable grille located in the front of the air conditioner. Louvers may be adjusted open, closed or any position in between by operation of control levers located on the right and left sides of the grille. Louvers of the discharge grille direct the flow of the conditioned air leaving the air conditioner.

b. Maintenance. Clean the louv
proved cleaning solvent and remo
tions that may interfere with th
and from the air conditioner. Che
intake louvers. Tighten loose m

3–10. Condenser Fan Guard and Screen

a. General. The condenser fan
ing is covered by an intake scr
vents entry of airborne objects int
air passage. A fan guard (fig. 1
in the condenser fan air discha
protect personnel from the revol

b. Maintenance. Brush dirt an
matter from screen and guard. Ins
damage. Tighten loose mounting
screen and guard with an app
solvent.

Section V. TROUBLESHOOTING

3–11. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner and its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

3–12. Compressor Fails to Start

Probable cause	Possible remedy
Power line failure	Restore power.
Selector switch improperly set.	Set selector switch to "COOL".
Circuit breaker tripped	Reset circuit breaker.
Defective compressor motor protective relay.	Test relay
Refer to
maintena
defective
Open or shorted control circuits.	Perform co
(para 3–
replace d
nent.
Defective compressor motor	Test compr
(para 6–
support r
motor is
Defective control circuit transformer.	Test transf
47). Repl
Defective control circuit rectifier.	Test rectifi
Replace i
3–21).
Defective RFI filters	Test filters
Replace i

ITEM	
5	EVAPORATOR FAN. Clean fan blades. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fans. Replace defective fan.
6	DRAIN PAN AND PIPING. Clean drain pan and drain piping. Inspect check valve for proper operation.
7	FRESH AIR FILTER. Clean fresh air filter.
8	INTAKE SCREEN. Clean condenser intake screen. Tighten loose mounting screws. Replace broken screen.
9	CONDENSER COIL. Clean condenser coil. Tighten loose mounting screws.
10	FAN GUARD. Clean fan guard. Tighten loose mounting screws.
11	CONDENSER FAN. Clean fan blade. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fan blade. Replace defective fan.
12	LIQUID SIGHT INDICATOR. Check for damage or broken glass. Check for full condition of refrigeration system and for mositure in system.
13	DAMPER CONTROL. Check for proper operation. Replace defective parts.
14	CONTROLS. Check for damage and faulty operation. Replace damaged or defective controls.
	NOTE: OPERATION. During operation observe any unusual noise or vibration.

Section IV. OPERATOR'S MAINTENANCE

3–8. General

The instructions in this section are published for the information and guidance of the operator to maintain the air conditioner.

Warning: **Disconnect the air conditioner from the power source before performing any maintenance on the components of this unit.**

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b. Maintenance. Clean the louv
proved cleaning solvent and remo
tions that may interfere with th
and from the air conditioner. Che
intake louvers. Tighten loose m

3–10. Condenser Fan Guard and Screen

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Section V. TROUBLESHOOTING

3–11. General

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Circuit breaker tripped	Reset circuit breaker.
Defective compressor motor protective relay.	Test relay
Refer to
maintena
defective
Open or shorted control circuits.	Perform co
(para 3–
replace d
nent.
Defective compressor motor	Test compr
(para 6–
support
motor is
Defective control circuit transformer.	Test transf
47). Repl
Defective control circuit rectifier.	Test rectifi
Replace
3–21).
Defective RFI filters	Test filters
Replace

Probable cause	Possible remedy
Defective condenser fan motor.	Replace condenser fan motor (para 3-36).

3-14. Reduced Cooling Capacity

Probable cause	Possible remedy
Dirty or clogged air filters	Clean or replace air filters (para 3-25 and 3-26).
Improperly adjusted (closed) evaporator return and discharge air grilles or fresh air and CBR air intakes.	Adjust louvers and dampers correctly (table 2-1).
Dirty or clogged evaporator coil.	Clean evaporator coil (para 3-31).
Improperly set temperature control (too high).	Set temperature control to desired ambient temperature.
Damaged or loose evaporator fans.	Check evaporator fans for damage or looseness. Replace if defective. (para 3-35).
Defective fan motor	Replace evaporator fan motor (para 3-35).
Defective temperature control.	Test temperature control (para 3-41). Replace if defective.

3-15. Blower Motor Fails to Start or Stops on Overload

Probable cause	Possible remedy
Defective selector switch	Test selector switch (para 3-41). Replace if defective.
Defective fan motor relay	Test relay (para 3-45). Replace if defective.
Defective fan motor protective relay.	Test relay (para 3-37). Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3-40). Repair or replace defective component.
Defective fan motor	Test motor (para 3-37). Repair or replace if defective.
Defective control circuit transformer.	Test transformer (para 3-47). Replace if defective.
Defective control circuit	Test rectifier (para 3-39).

3-16. No Heat or Reduced H

Probable cause	
Power line failure	Restor
Restricted air flow over heaters.	Clean 3-31 3-25 grill
Loose connections or defective wiring in heater or fan circuits.	Tighte Repa
Inoperative evaporator fan motor.	Replac moto
Defective selector switch	Test se 3-41 tive.
Defective temperature control.	Test te (par defec
Defective heater thermostatic switch.	Test he switc place
Defective or damaged heater elements.	Test he Repl defec
Defective heater relay	Test re Repl
Open or shorted control circuits.	Perfor (par repla nent.
Defective control circuit transformer.	Test tr 47). tive.
Defective control circuit rectifier.	Test re Repla
Defective RFI filters capacitors.	Test RI 22).

3-17. Inoperative Compresso Heater

Probable cause	
Air conditioner disconnected from power line to stop unit.	Stop un lector leave powe
Loose electrical connections	Tighten

3–19. General Methods Used to Attain Proper Suppression

a. Essentially, suppression is attained by providing a low resistance path to ground for stray currents. Methods used include shielding the ignition and high frequency wires, grounding the frame with bonding straps, and using capacitors and resistors.

b. In the air conditioner, filters are used to ground RFI—producing stray currents in the electrical system. All magnetic contactors and switches are effectively shielded in metal boxes. The control panel, air conditioner casing, and junction box are bonded to each other with electrical leads. The air conditioner is grounded through the junction box to the power line ground wire.

3–20. Interference Suppression Components

a. Primary Suppression Components. The primary suppression components are those whose primary function is to suppress radio frequency interference. These components a
located in figure 3–3.

b. Secondary Suppression Co
components have radio freque
suppression functions which are
or secondary to their primary f

3–21. Replacement of Suppress Components

Refer to figure 3–3 and replace
interference suppression compon
individual filters, refer to figur
semble filter and rectifier assem

3–22. Testing of Radio Interfere Suppression Components

a. RFI Filters. Test the filter
nuity tester or multimeter on l
replace defective filters. If test
available and interference is i
cause by the trial-and-error met
each filter in turn until the caus
is located and eliminated.

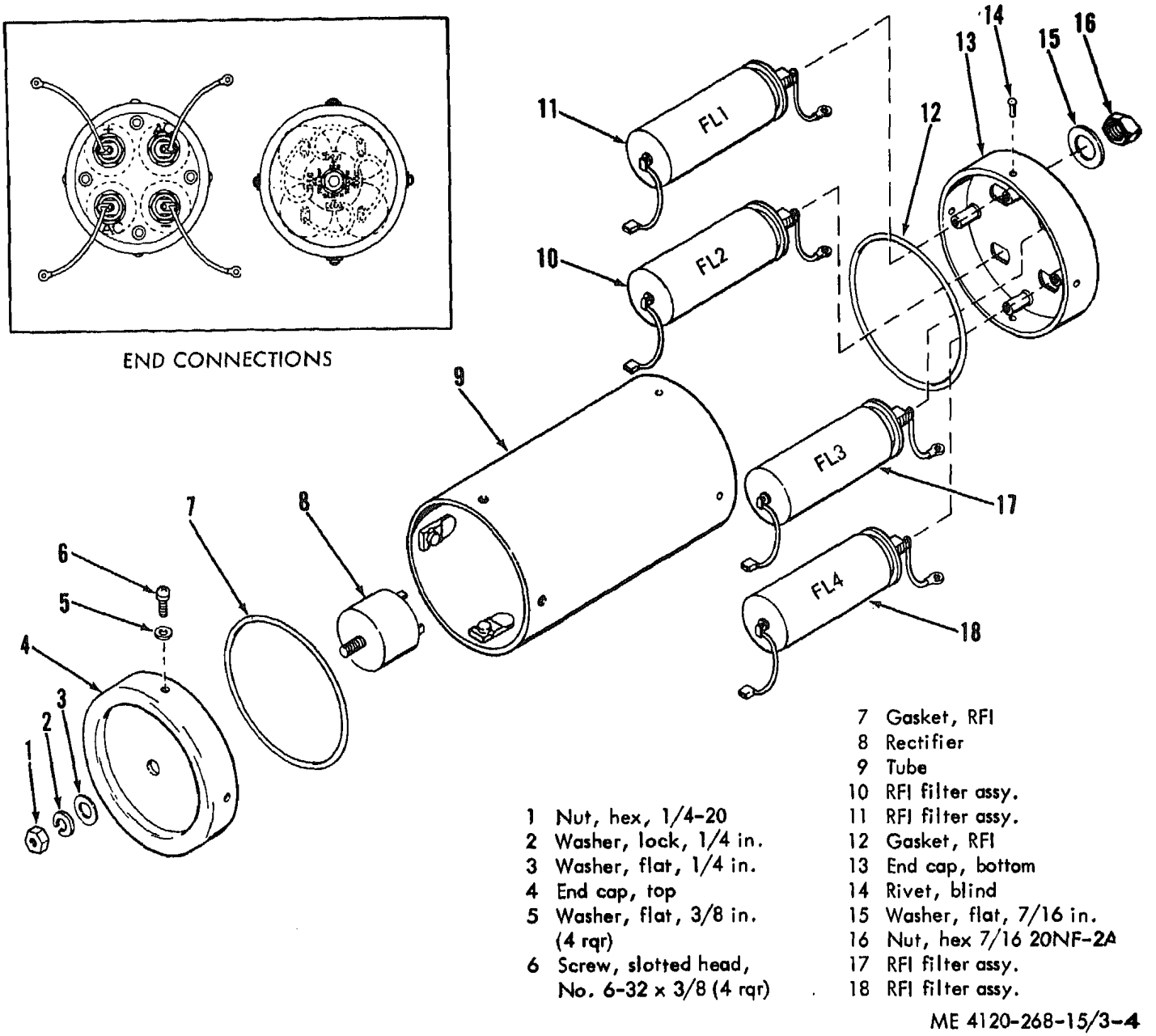


Figure 3-4. Filter and rectifier assembly, exploded view.

b. Rectifier.

(1) Using a multimeter on DC VOLTS range measure rectifier output voltage across positive and negative terminals when 28V AC is applied to the AC terminals through a step-down transformer. Rectifier output should measure 24 ± 5V DC. Replace rectifier if output voltage is less than specified.

(2) Using a multimeter on OHMS range measure rectifier resistance between terminals 1–2, 2–4, 4–3, and 3–1.

(3) Repeat above procedure, reversing leads to measure resistance between terminals 2–1, 4–2, 3–4 and 1–3.

(4) Compare reading against following chart. Replace rectifier if readings are substantially higher or lower than specified.

Terminal pair	Resistance reading
1–2	1000 ohms or higher
2–1	1 ohm or lower
2–4	1 ohm or lower
4–2	1000 ohms or higher
4–3	1 ohm or lower
3–4	1000 ohms or higher

Section VII. GRILLES, COVERS, SCREENS, PANELS, FILTERS, FAN GUARD, DAMPER DOOR, AND INSTRUCTION PLATES

3–23. General

The air conditioner is constructed with removable aluminum panels. The front access panel provides access to the control panel, junction box, compressor and associated components. A discharge grille protects the evaporator coil and controls the discharge of conditioned air. The intake grille protects the air filter and regulates the amount of air returned to the unit. The condenser coil screen protects the condenser coil. A fan guard protects the condenser fan from damage and protects personnel from injury by the fan. A fresh air inlet opening, covered by a filter, permits the entry of outside air; the amount is regulated by a damper door operated by a knob and linkage. The CBR intake cover provides a closure for the CBR filter attachment opening when CBR filter is not in use.

Warning: **Disconnect air conditioner from power source before performing any maintenance on the components of the unit.**

3–24. Top Panel Assembly, Discharge Grille, Intake Grille, and Front Access Panel

a. Removal. Refer to figure 3–5, and remove the top panel assembly, discharge grille, intake grille and front access panel.

Note. If canvas cover (fig. 1–2) is installed, release fasteners and remove cover before removing top panel assembly.

b. Inspection. Inspect insulation and gaskets for damage or deterioration. Inspect grilles for bent louvers.

c. Disassembly. Refer to figure 3–6 and disassemble panels and grilles as required to replace defective parts. To remove front access panel insulation, straighten clips and remove holding plates.

d. Repair. Straighten bent louvers in grilles. Louvers in intake grille must operate freely. Replace damaged rivet nuts and panel fastener screws.

e. Assembly. Refer to figure 3–6 and assemble any parts that were removed. Cement gaskets and insulation in place. After installing insulation holding plates on front panel, bend ends of clips over to hold plates in place.

f. Installation. Install the top panel assembly, discharge grille, intake grille, and front access panel in reverse order of removal as illustrated in figure 3–5.

3–25. Air Conditioning Filter

a. General. The air conditioning filter is located under the evaporator blower assembly. It removes airborne particles of dust and other contaminants from the conditioned area.

b. Removal. Refer to paragraph 3–24 and remove air intake grille. Refer to figure 3–7 and remove air conditioning filter.

c. Servicing. Refer to figure 3–7 and service air filter.

d. Installation. Refer to figure 3–7 and install air filter. Refer to paragraph 3–24 and install air intake grille.

3–26. Fresh Air Filter, CBR Cover, Motor Access Cover, Fan Guard, and Condenser Air Inlet Screen

a. Removal. Refer to figure 3–8, and remove the fresh air filter, CBR cover, motor access cover, fan guard, and condenser air inlet screen.

b. Cleaning. Wash fresh air filter thoroughly in an approved cleaning solvent and dry thoroughly with compressed air. Coat filter with an adhesive by immersion or spraying (section III, appendix B). Drain excess adhesive before installing filter. Clean metal parts with an approved cleaning solvent.

c. Installation. Install the fresh air filter, CBR cover, motor access cover, fan guard, and condenser air inlet screen in reverse order of removal as illustrated in figure 3–8. Fresh air filter must be installed in accordance with airflow arrow stamped on filter.

3–27. Damper Control

a. General. The damper control includes the fresh air damper door and the mechanism for opening and closing the door.

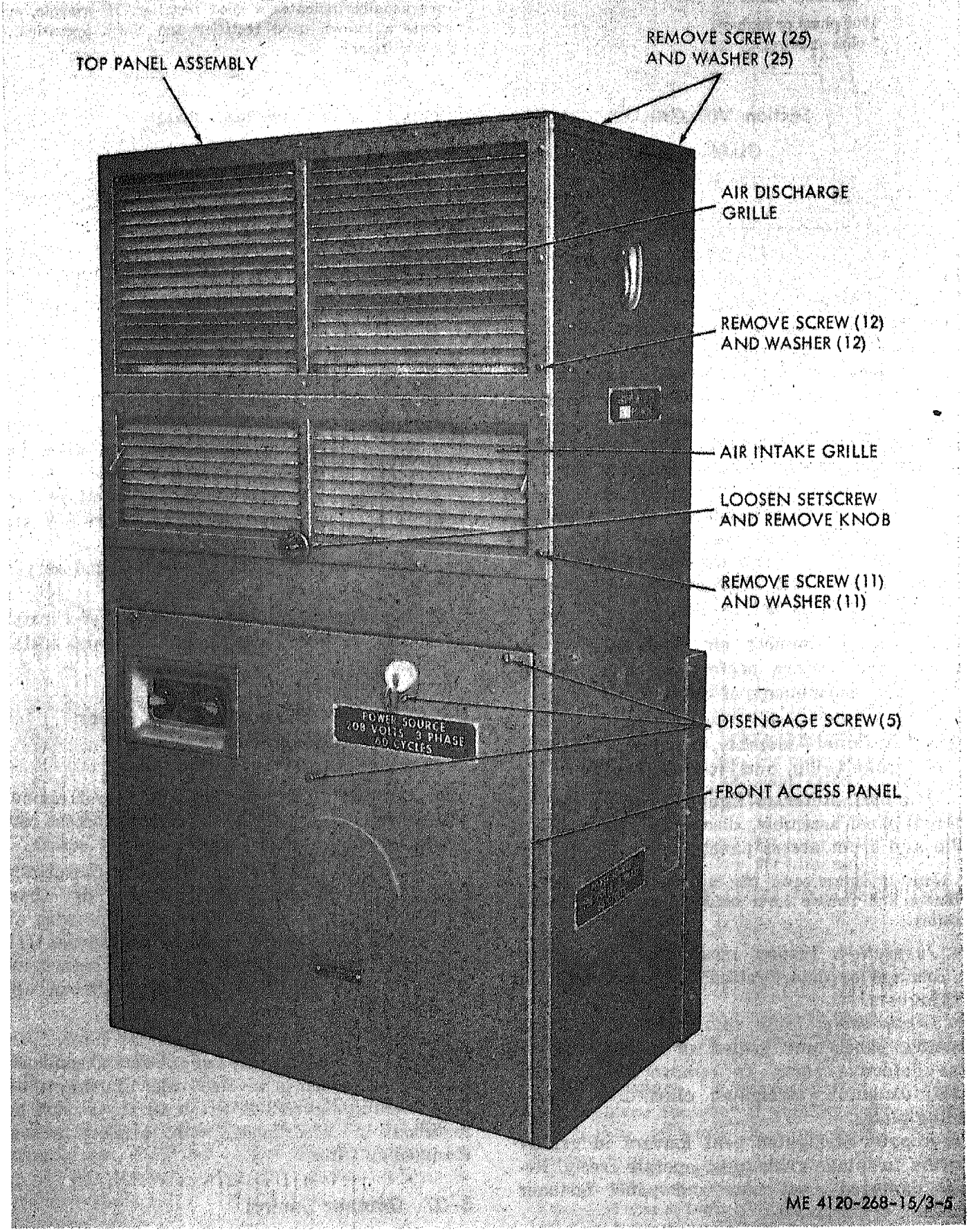


Figure 3–5. Top panel assembly, air intake grille, air discharge grille and front access panel, removal and installation.

b. Removal. Refer to figure 3–9 and remove fresh air damper control assembly.

c. Disassembly. Refer to figure 3–10 and disassemble damper control in numerical sequence.

Note. Knob instruction plates are different for front and back. Mark or tag plates, if removed from knobs, to assure correct location during installation.

d. Cleaning. Clean all parts in an approved cleaning solvent and dry with compressed air.

e. Inspection and Repair.

(1) Inspect control rod and levers for bent condition. Straighten if possible or replace.

(2) Inspect gears for damaged, worn or broken teeth. Replace defective parts.

(3) Inspect door for warped condition or loose or broken hinges. Tighten or replace hinges as necessary. Replace door assembly if badly warped or otherwise damaged.

(4) Inspect spring washers for flattened or broken condition. Replace defective washers.

f. Assembly. Refer to figure 3–10 and reassemble damper control. Do not attach linkage to door until damper control and door have been installed in the air conditioner.

g. Installation. Refer to figure 3–9 and install the fresh air damper control assembly by reversing the removal procedures.

h. Adjustment.

(1) Loosen screws and nuts, securing housing to partition. Move housing to location where door can be tightly closed by operating the control. Tighten screws.

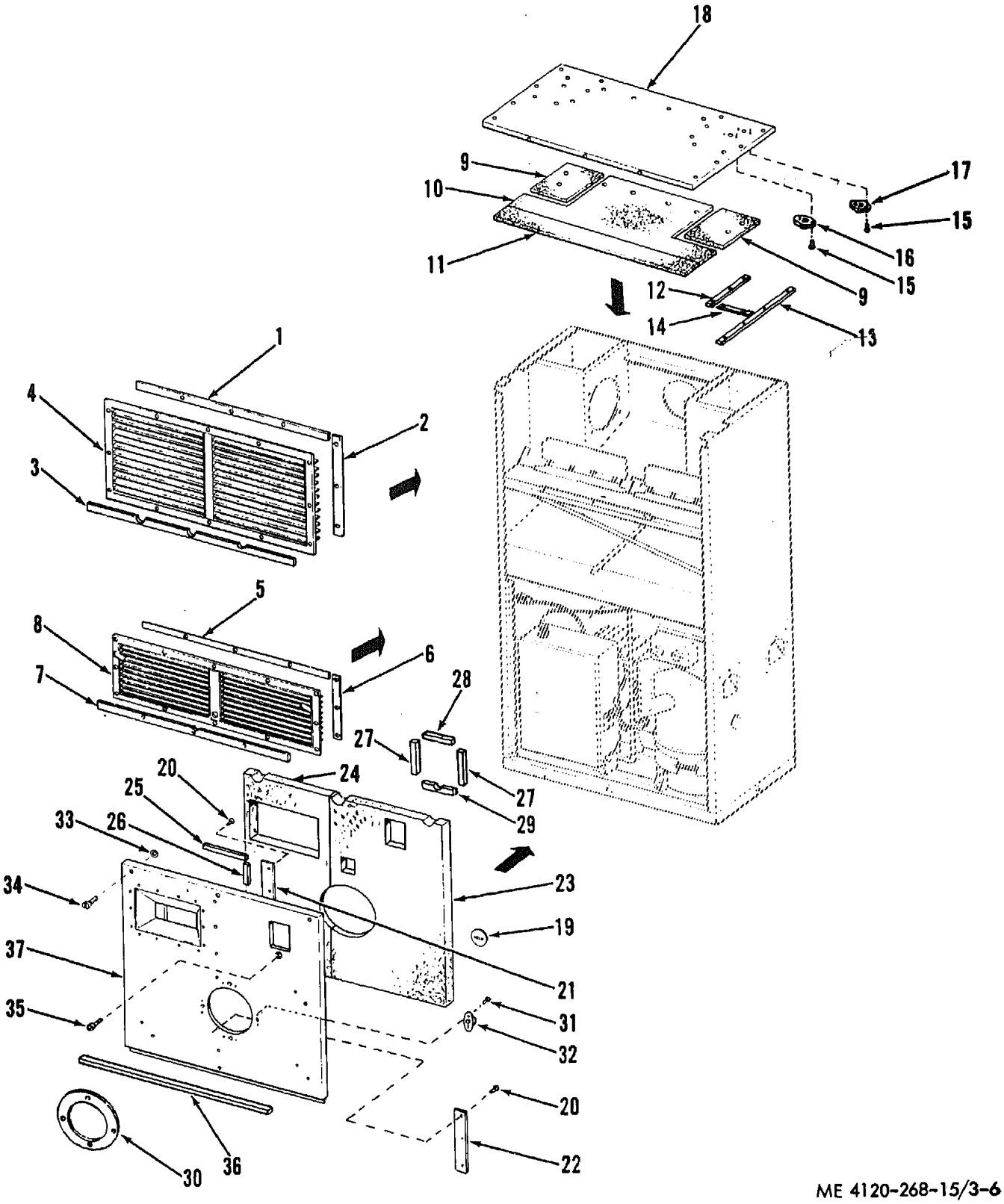
(2) Tighten self-locking nut on long screw that passes through worm gear and lever assembly until spring washers begin to compress and place drag on linkage. Drag must be sufficient to hold door in any position.

3–28. Instruction Plates

a. General. Instruction plates provide information for operation of the air conditioner.

b. Removal. Carefully file rivets attaching instruction plates to casing and remove plates.

c. Installation. Set new rivets to attach new plate securely. Use care to avoid damaging external panels.

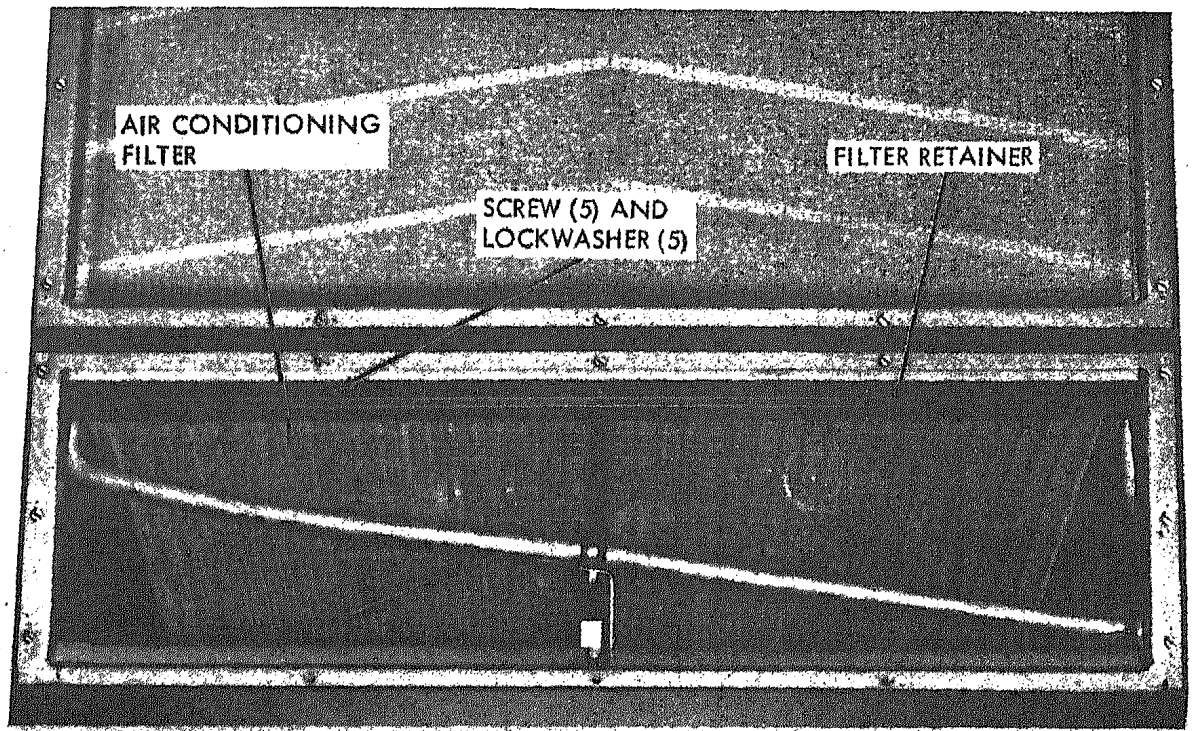


1 Gasket
2 Gasket (2 rqr)
3 Gasket
4 Grille
5 Gasket
6 Gasket (2 rqr)

Figure 3-6. Air intake and discharge grilles, top panel assembly, and front access panel, exploded view.

7 Gasket
8 Grille
9 Insulation (2 rqr)
10 Insulation
11 Insulation
12 Gasket (2 rqr)
13 Gasket (2 rqr)
14 Gasket (2 rqr)
15 Rivet, 3/32 x 1/4 in. (22 rqr)
16 Nut, plate, No. 10–32 (2 rqr)
17 Nut, plate, No. 8–32 (9 rqr)
18 Panel, top
19 Plate, holding
20 Rivet, blind, 1/4 in. (7 rqr)
21 Strip
22 Strip
23 Insulation
24 Insulation
25 Gasket (2 rqr)
26 Gasket (2 rqr)
27 Gasket (2 rqr)
28 Gasket
29 Gasket
30 Gasket
31 Rivet, 1/8 x 5/16 in.
32 Receptacle
33 Washer, retaining (5 rqr)
34 Screw, panel fastener (3 rqr)
35 Screw, panel fastener (2 rqr)
36 Gasket
37 Panel, front

Figure 3–6—Continued.



STEP 1. REMOVE SCREWS (5), LOCK WASHERS (5), AND FILTER RETAINER.
STEP 2. REMOVE AIR CONDITIONING FILTER.
STEP 3. WASH FILTER IN APPROVED CLEANING SOLVENT AND DRY THOROUGHLY WITH COMPRESSED AIR. INSPECT FOR SERVICEABILITY.
STEP 4. COAT FILTER WITH AN ADHESIVE BY IMMERSION OR SPRAYING (REFER TO SECTION III APPENDIX B). DRAIN EXCESS ADHESIVE BEFORE INSTALLING FILTER.

NOTE: FILTER MUST BE INSTALLED IN ACCORDANCE WITH STAMPED AIR FLOW ARROW.

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Figure 3–7. Servicing air conditioning filter.

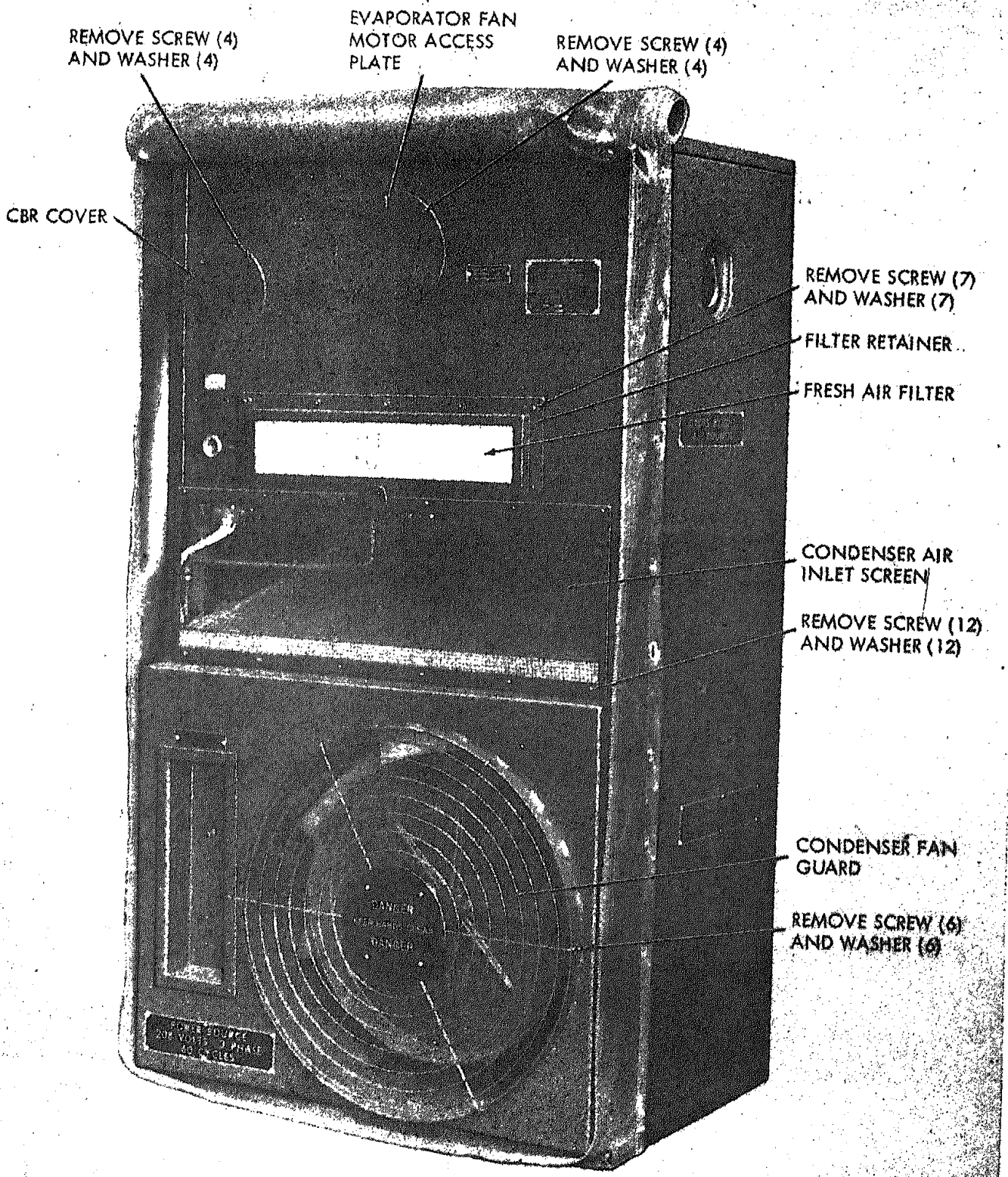


Figure 3-8. Fresh air filter, CBR cover, motor access cover, fan guard, and condenser air inlet screen, removal and installation.

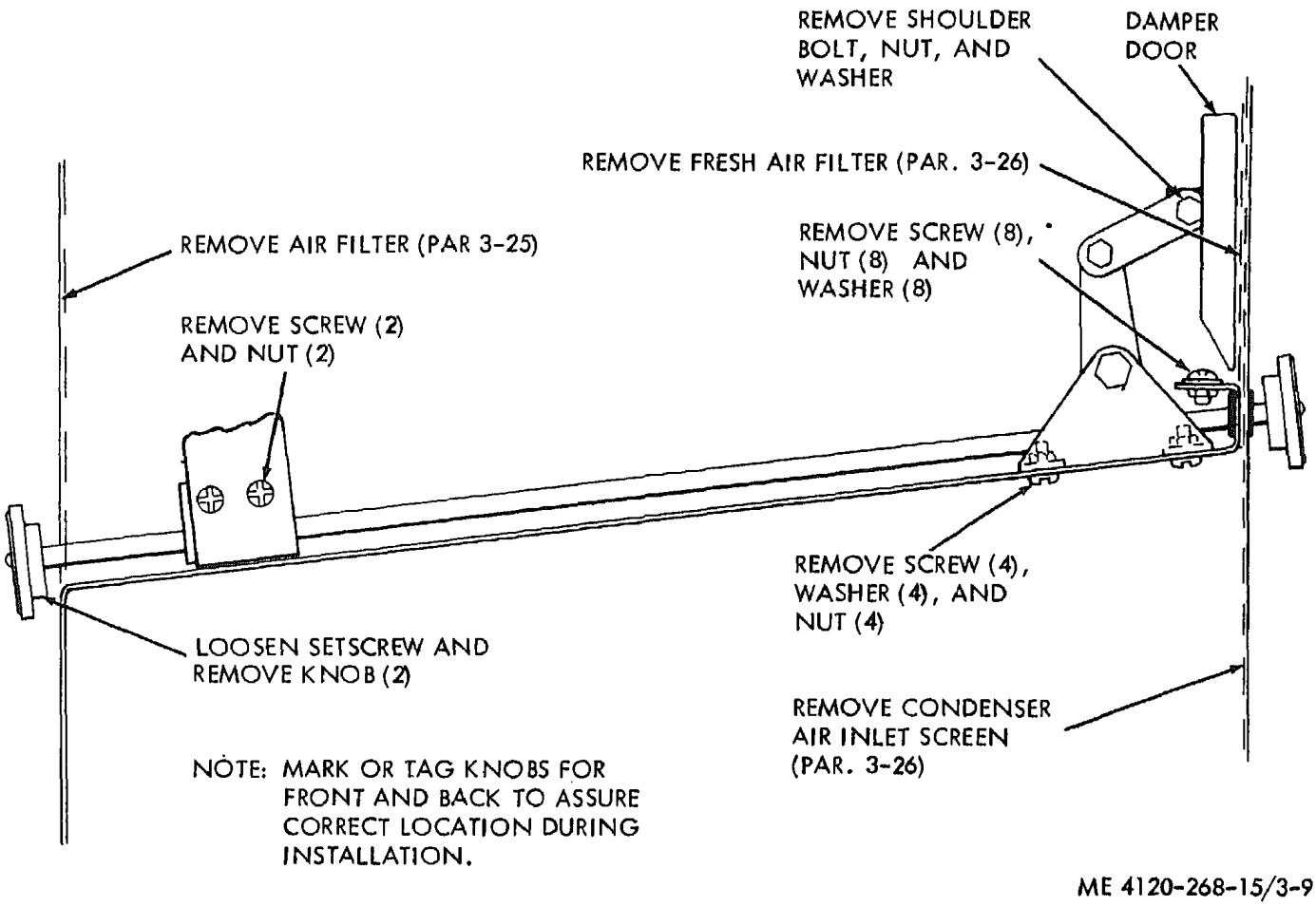


Figure 3-9. Fresh air damper control, removal and installation.

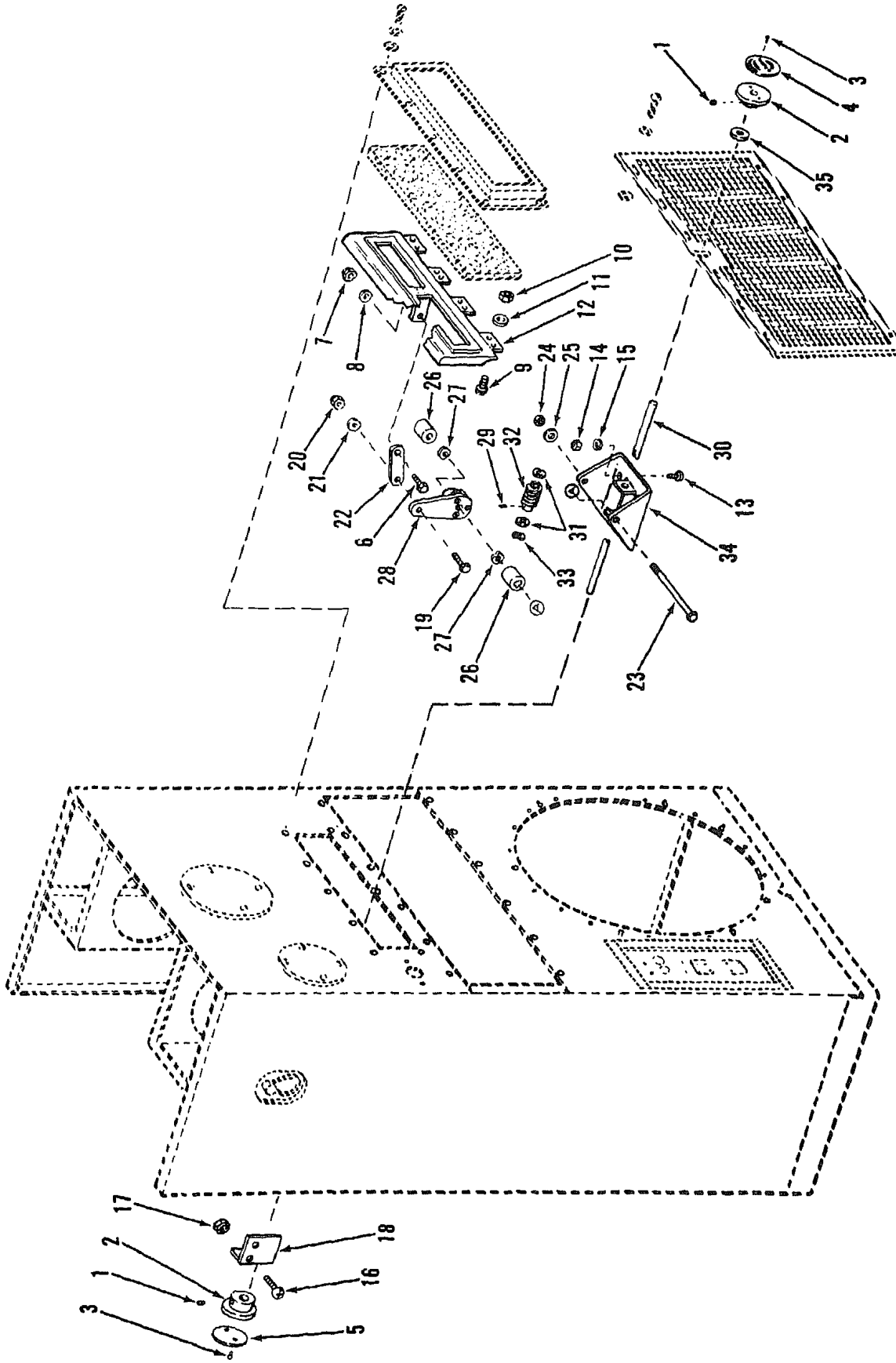


Figure 3-10. Damper control, exploded view.

1 Setscrew, cup point, No. 10–32 x 3/8 in. (2 rqr)
2 Knob (2 rqr)
3 Screw, drive, No. 2 x 3/16 in. (4 rqr)
4 Plate, instruction
5 Plate, instruction
6 Bolt, shoulder, 1/4–28 x .713 in.
7 Nut, self-locking, 1/4–28
8 Washer, flat, 1/4 in.
9 Screw, machine, pan head, No. 8–32 x 5/8 in. (8 rqr)
10 Nut, self-locking, hex, No. 8–32 (8 rqr)
11 Washer, flat, No. 8 (8 rqr)
12 Damper door
13 Screw, machine, No. 10–32 x 5/8 in. (4 rqr)
14 Nut, self-locking, hex, No. 10–32 (4 rqr)
15 Washer, flat, No. 10 (4 rqr)
16 Screw, machine pan head, No. 10–32 x 5/8 in. (2 rqr)
17 Nut, self-locking, hex, No. 10–32 (2 rqr)
18 Angle bracket
19 Bolt, shoulder, 1/4–28 x .838 in.
20 Nut, self-locking, hex, 1/4–28
21 Washer, flat, 1/4 in.
22 Linkage arm
23 Screw, cap, hex head, 1/4–28 x 3 in.
24 Nut, self-locking, hex, 1/4–28
25 Washer, flat, 1/4 in.
26 Spacer
27 Washer, spring (2 rqr)
28 Worm gear assembly
29 Pin, spring, 3/32 x 11/16 in.
30 Control rod
31 Washer, flat, 5/16 in. (2 rqr)
32 Worm
33 Washer, spring
34 Housing
35 Grommet

Figure 3–10—Continued.

Section VIII. MIST ELIMINATOR, COILS, AND DRAIN PIPING

3–29. General

The mist eliminator, located between the air discharge grille and the evaporator coil, removes moisture from the air after the air has passed over the evaporator coil. A drip pan located below the mist eliminator and evaporator coil, is provided to catch condensate. Drain tubes attached to the drip pan are connected to a removable gooseneck type drain tube located in the lower part of the air conditioner. The drain tube consists of a gooseneck tube and spring loaded check valve. The check valve prevents air from entering the evaporator compartment when the drain tube is dry.

3–30. Mist Eliminator

a. Removal. Refer to paragraph 3–24 and remove the evaporator air discharge grille and top panel assembly. Refer to figure 3–11 and remove mist eliminator.

b. Servicing. Refer to figure 3–11 and clean the mist eliminator.

c. Installation. Refer to figure 3–11 and install the mist eliminator. Install evaporator discharge grille and top panel assembly (para 3–24).

3–31. Evaporator Coil Service

a. General. The evaporator coil should be cleaned each time the mist eliminator is serviced. The coil may be cleaned without removal from air conditiioner.

b. Maintenance Procedure. Refer to figure 3–11 and perform prescribed maintenance service

3–32. Drip Pan and Drain Tube

a. General. The mist eliminator drip pan will be cleaned when the mist eliminator is serviced Refer to figure 3–11. Maintenance of the gooseneck drain tube, check valve and hose is covered in this paragraph.

b. Removal and Disassembly. Refer to figure 3–12 and remove and disassemble the gooseneck drain tube.

c. Cleaning, Inspection, and Repair. Clean all parts thoroughly. Inspect hose for cracks or deterioration. Inspect tube for cracks or damaged valve seat. Inspect spring for weak or broken condition. Replace defective parts.

d. Reassembly and Installation. Reassemble and install drain tube (fig. 3–12).

3–33. Condenser Coil Service

a. General. The condenser coil may be cleaned without removal from the air conditioner. Clean screen, guard, and condenser fan blade when cleaning condenser coil.

b. Maintenance Procedure. Refer to figure 3–13 and perform prescribed maintenance service.

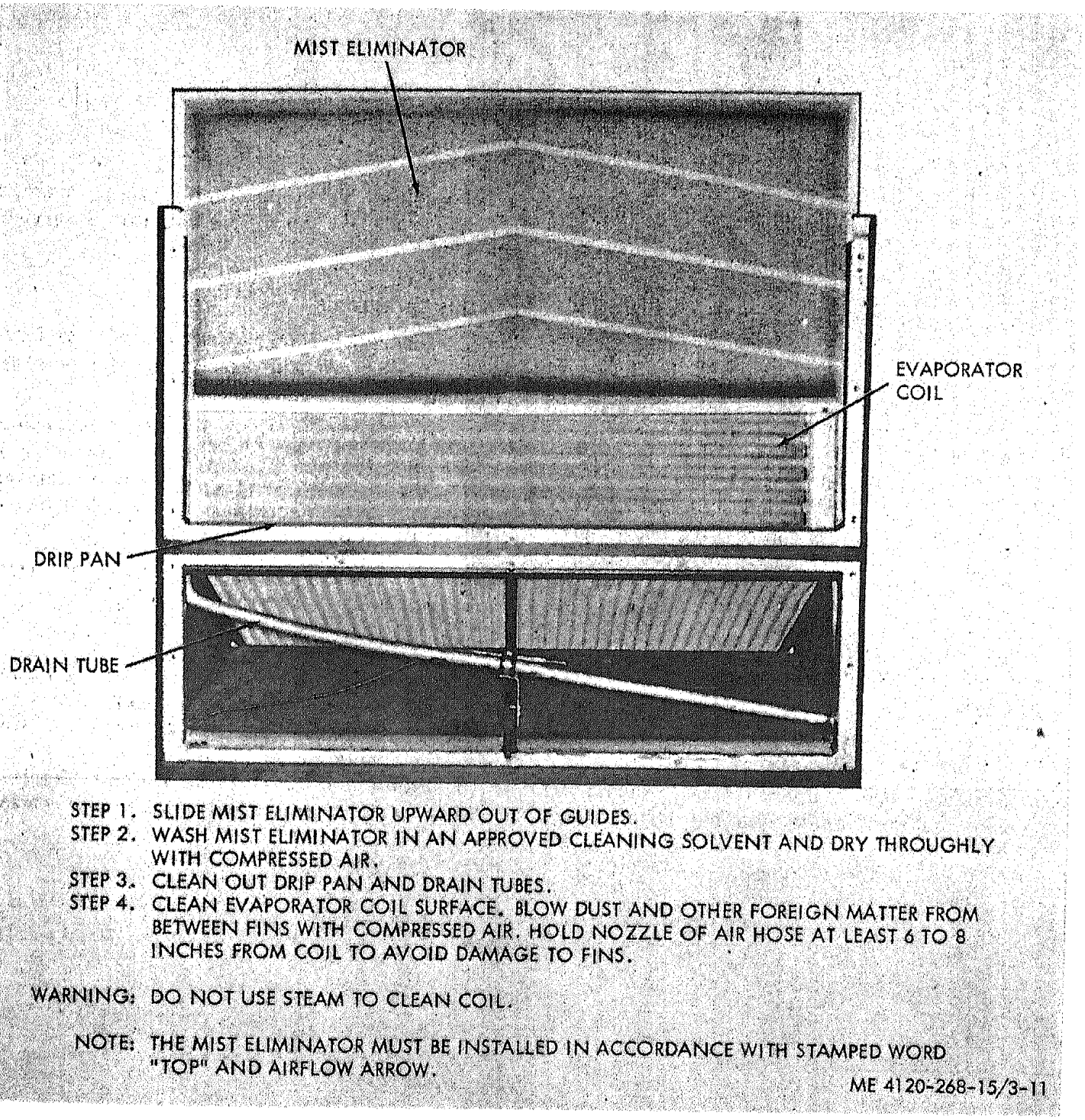


Figure 3–11. Servicing mist eliminator and evaporator coil.

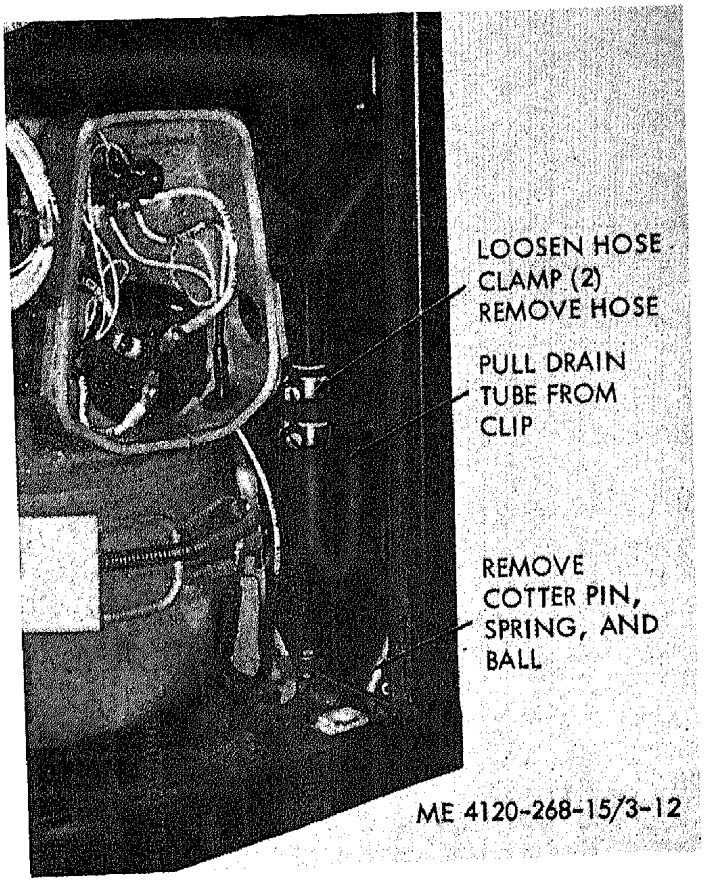


Figure 3-12. Drain tube, removal, disassembly, reassembly and installation.

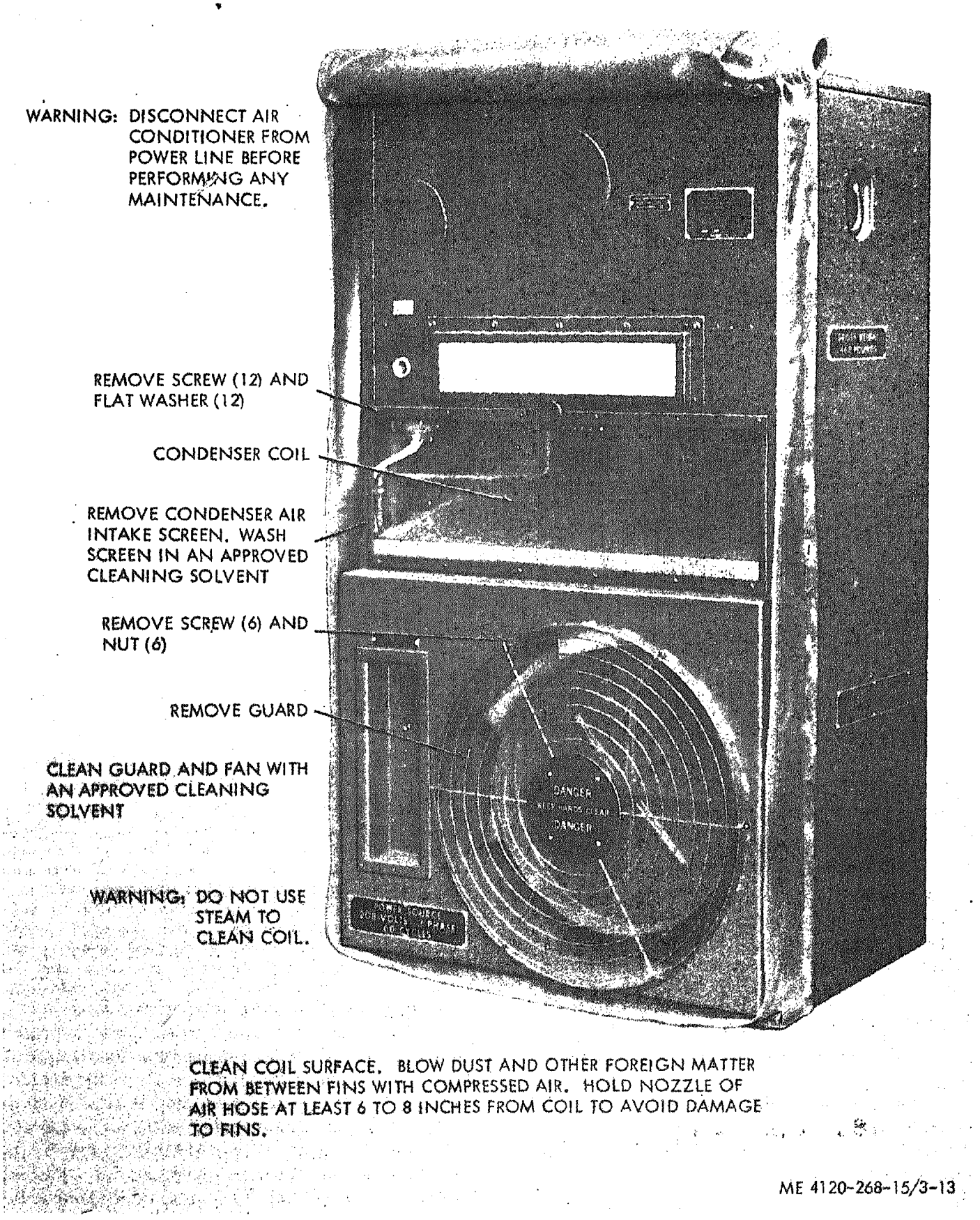


Figure 3–13. Servicing condenser coil, fan, and screen.

Section IX. FANS AND MOTORS

3–34. General

The MAC4V40–340–3 and MAC6V40–340–2 air conditioners are equipped with centrifugal air foil evaporator fans. The double end shaft motor is mounted on a bracket at the top of the air conditioner behind the evaporator coil and heaters. The vaneaxial condenser fan is mounted on the motor shaft. The fan motor support, baffle, and venturi ring are mounted on the lower back panel.

3–35. Evaporator Fan and Motor Assembly

a. Removal.

Note. The motor may be tested (para 3–37) without removing the motor from the air conditioner.

(1) Refer to paragraph 3–24 and remove top panel assembly.

(2) Refer to paragraph 3–26 and remove fan motor access plate.

(3) Refer to figure 3–14 and remove inlet rings and fan and motor assembly.

b. Disassembly. Refer to figure 3–14 and remove fans and keys from motor.

c. Motor Test. Refer to paragraph 3–37 for motor tests and repairs.

d. Assembly. Refer to figure 3–14 and assemble fan and motor assembly in reverse order of disassembly.

e. Installation.

(1) Refer to figure 3–14 and install evaporator fan and motor assembly.

(2) Install motor access plate (para 3–26).

(3) Install top panel assembly (para 3–24).

3–36. Condenser Fan and Motor

a. Removal.

(1) Remove fan guard (para 3–26).

(2) Refer to figure 3–15, and remove the condenser fan.

Note. The motor may be tested (para 3–37) without removing the motor from the air conditioner.

(3) Remove front access panel (para 3–24).

(4) Refer to figure 3–16 and remove condenser fan motor.

b. Motor Test. Refer to paragraph 3–37 for motor tests and repairs.

c. Installation.

(1) Refer to figure 3–16 and install motor in reverse order of removal.

(2) Install front access panel (para 3–24).

(3) Install the condenser fan in reverse order of removal as illustrated on figure 3–15.

(4) Install fan guard (para 3–26).

3–37. Evaporator Fans and Condenser Fan Electric Motors

a. General. The evaporator and condenser fan motors are of the squirrel cage, induction type. Both motors operate on three-phase 208V AC and are connected across the line by means of individual relays energized by the control circuit. Motors on the MAC4V40–340–3 air conditioner are designed for 400 cycle service. The MAC4V-60–340–2 motors operate on 50–60 cycles. Both models are similar in appearance and are protected by internal self-resetting thermal overload and overcurrent protectors.

b. On-Equipment Testing. Before removing the motor for replacement, test the motor windings for opens and grounds:

(1) Disconnect receptacle connector from motor junction box.

(2) Test continuity across each combination of two motor terminals. Lack of continuity indicates an open winding.

(3) Place one contact of the tester against motor housing and the other against the motor terminals one at a time. If a circuit is indicated, the motor is grounded.

(4) Test the motor stator for insulation resistance as instructed in TM 5–764. The insulation resistance should measure not less than 0.5 megohms for the motor on either model.

Note. The resistance measurement should be used only as a general guide, taking into consideration the accuracy of the instrument used, test lead resistance, and ambient temperature at time of test. If more precise measurement is required, an instrument such as a Kelvin or Wheatstone bridge should be used, or comparative measurement between the suspected component and a like item known to be good should be utilized. In all cases where a megohmmeter is used for testing, make certain that the unit is thoroughly dry. Wet condemnation tolerances should be considered.

(5) Connect the air conditioner to a proper source of power. Use a hook-type ammeter and read the amperage flowing in each of the evaporator fan motor leads. On model MAC4V40–340–3 the ammeter should indicate between 3.8 and 2.66 amperes. On model MAC6V40–340–2 the ammeter should indicate between 7.9 and 5.43 amperes at full load for model MAC4V40–340–3. On model MAC6V40–340–2 the ammeter should indicate between 5.97 and 4.18 amperes at full load.

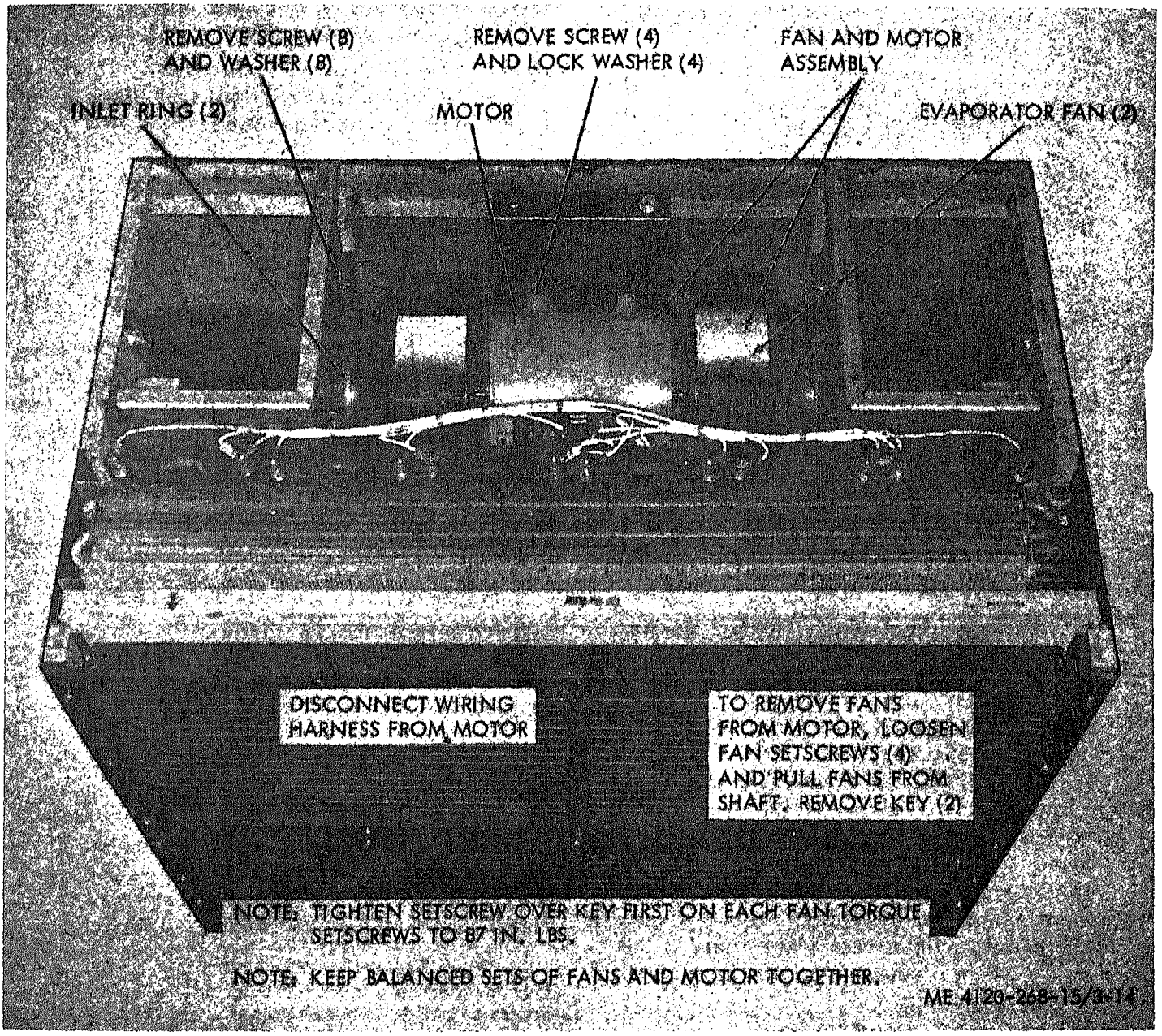


Figure 3–14. Evaporator fan and motor assembly, removal, disassembly, assembly and installation.

c. Removal. Refer to paragraphs 3–35 and 3–36 and remove fan motors.

d. Disassembly. Refer to figure 3–17 and disassemble the evaporator fan motor. Refer to figure 3–18 and disassemble the condenser fan motor.

e. Testing of Overload Protector. Disconnect the electrical leads from the overload protector. Test the protector with a multimeter set on OHMS. If continuity does not exist, replace the overload protector.

f. Cleaning, Inspection and Repair.

(1) Clean all metal parts with a cloth dampened in approved cleaning solvent.

(2) Inspect the stator housing for cracks, breaks, or other defects. Replace a damaged or defective housing.

(3) Inspect bearings for pits, scoring, wear, and out-of-round. Replace worn or defective bearings.

(4) Inspect the rotor shaft for cracks, wear, and misalinement. Replace a damaged or defective rotor.

(5) Inspect rotor for cracks, breaks, and damaged laminations. Replace the rotor and stator if they are damaged.

(6) Inspect all threaded parts for damage. Replace as necessary.

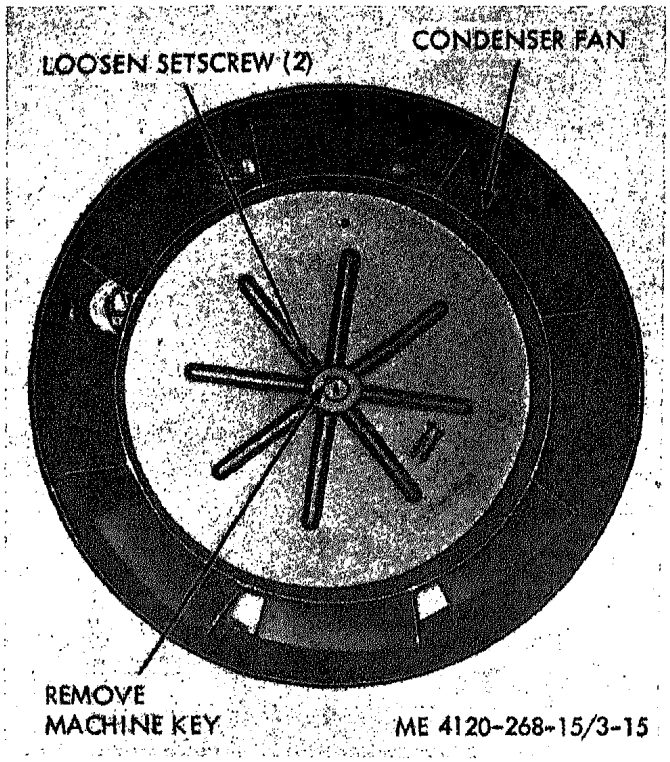


Figure 3–15. Condenser fan, removal and installation.

g. Reassembly. Refer to figure 3–17 and reassemble the evaporator fan motor. Refer to figure 3–18 and reassemble the condenser fan motor.

h. Installation. Refer to paragraphs 3–35 and 3–36 and install the fan motors.

3–38. Back Panel and Motor Support

a. Removal. Refer to figure 3–19 and remove back panel and motor support assembly.

b. Installation. Refer to figure 3–19 and install back panel by reversing removal procedures.

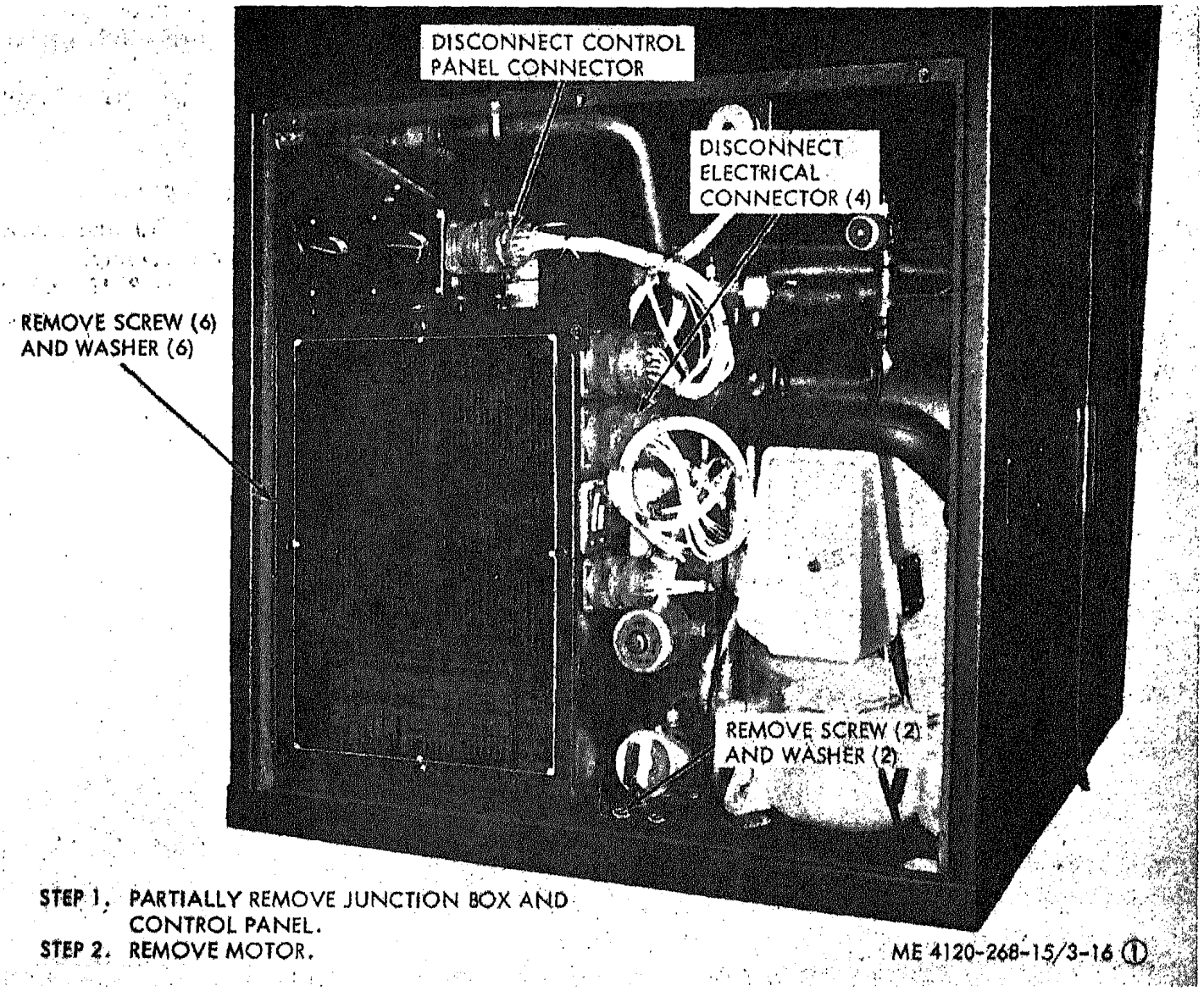


Figure 3–16. Condenser fan motor, removal and installation (Sheet 1 of 2).

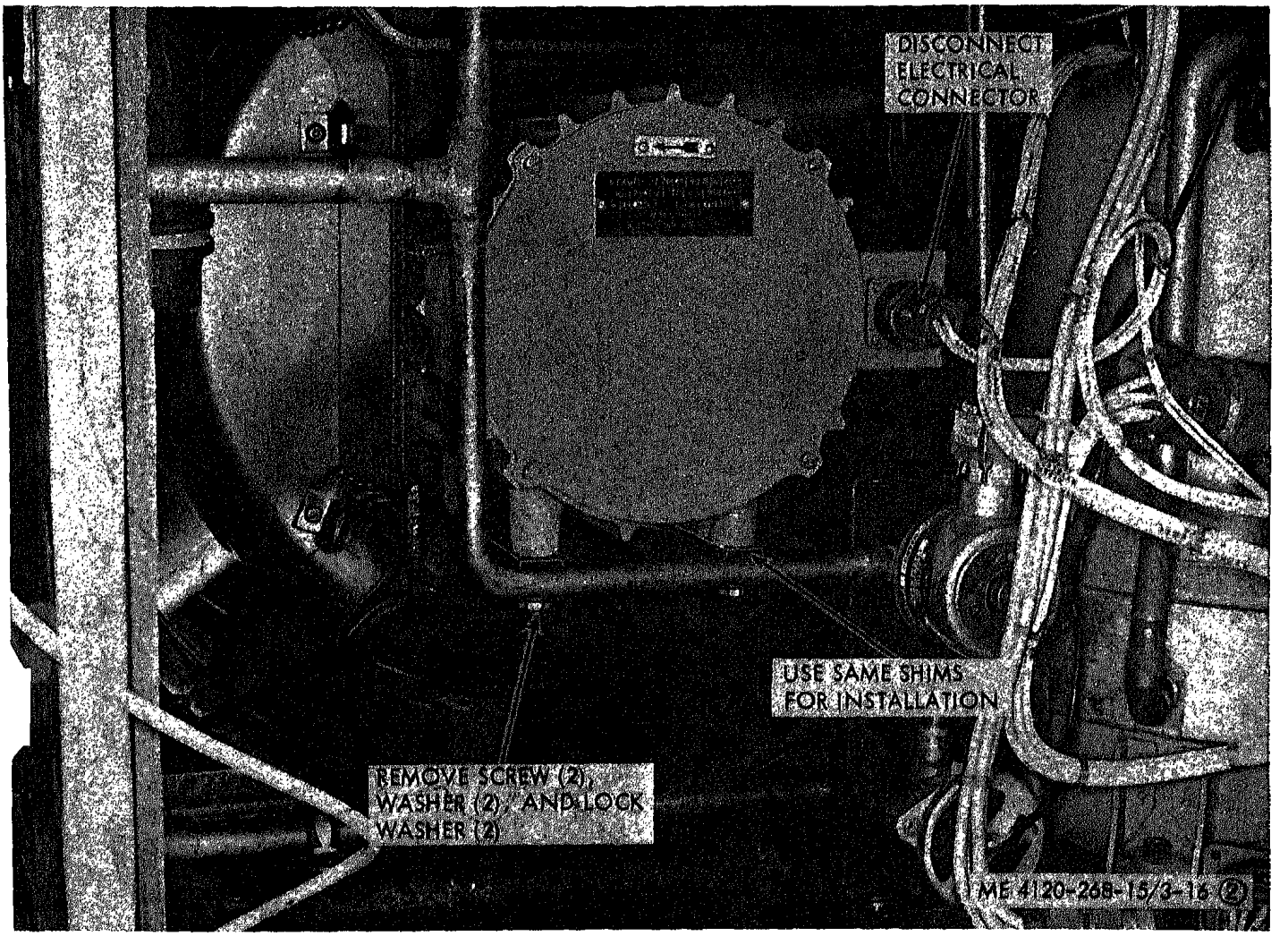


Figure 3-16. Condenser fan motor, removal and installation (Sheet 2 of 2).

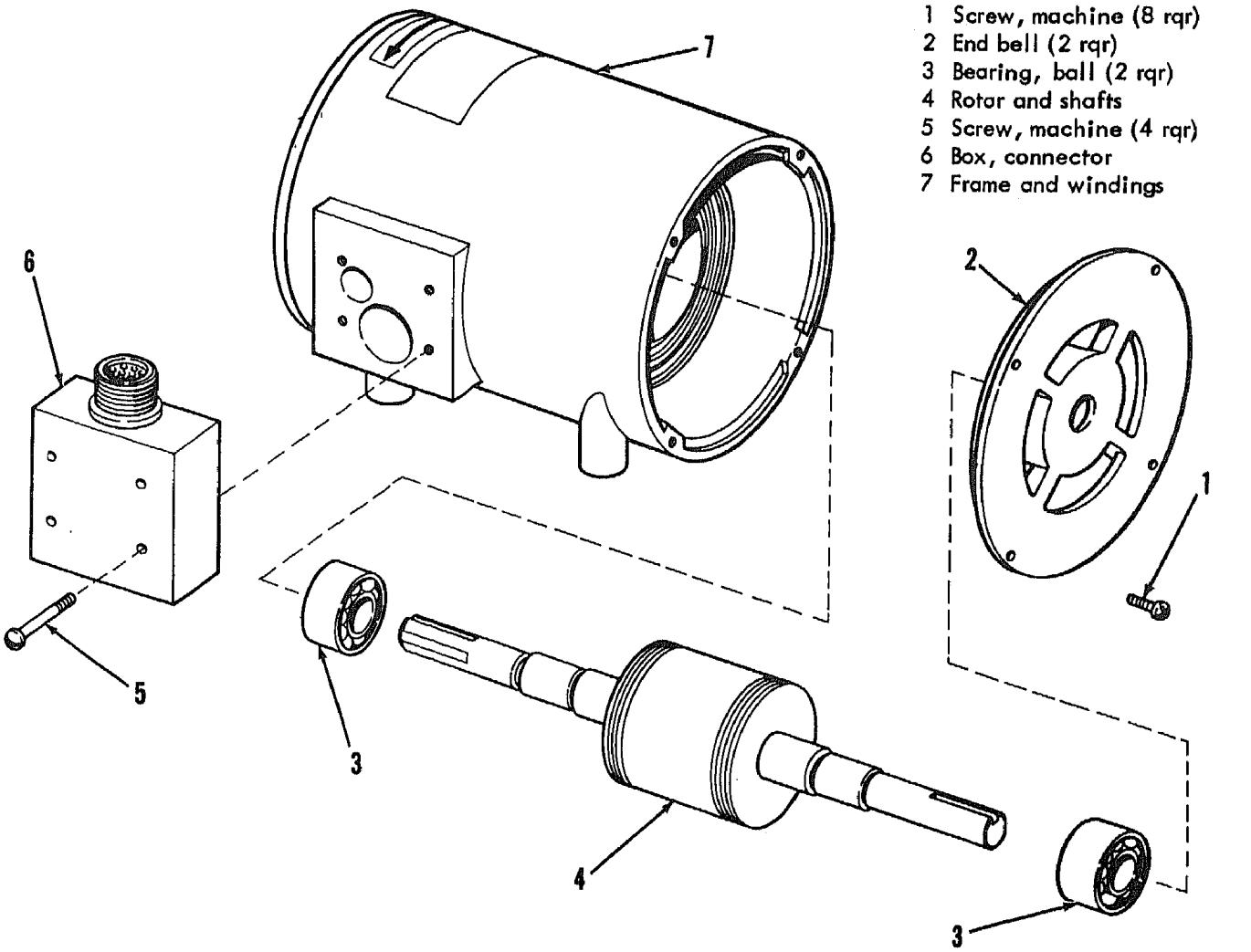


Figure 3-17. Evaporator fan motor, exploded view.

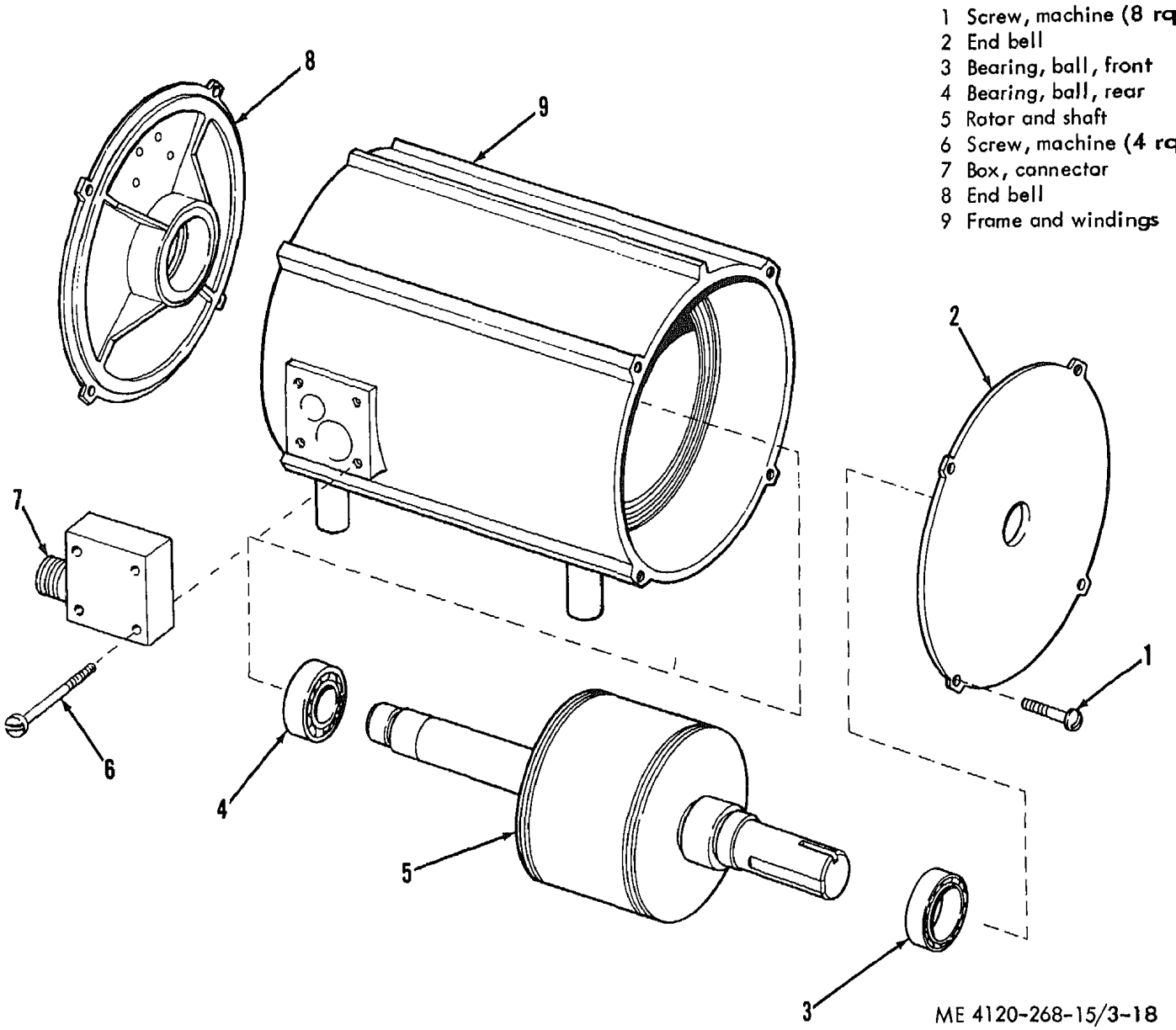


Figure 3-18. Condenser fan motor, exploded view.

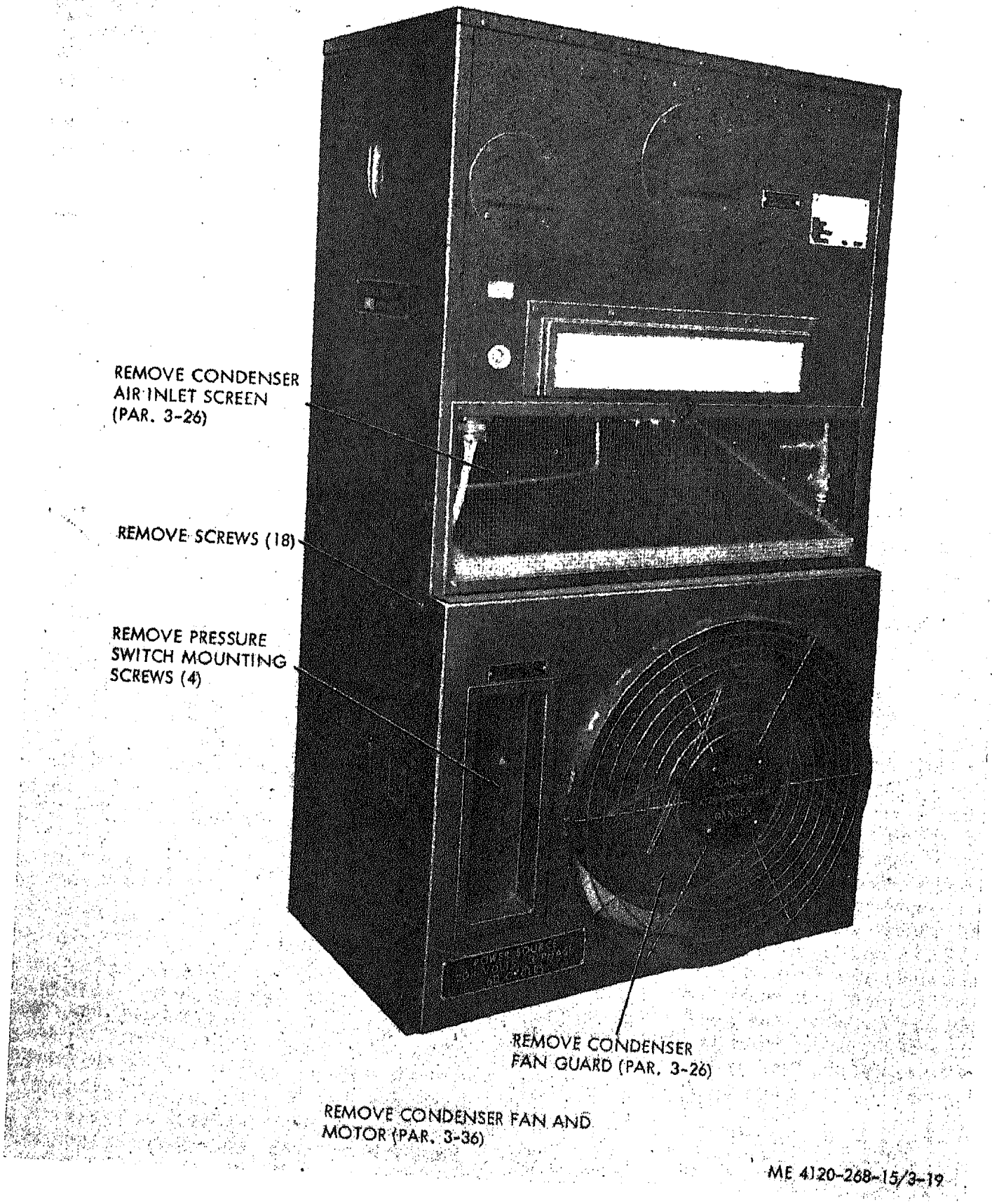


Figure 3–19. Back panel and motor support, removal and installation.

3–39. General

The electrical system (fig. 1–4 and 1–5) consists of the compressor, fan motors, relays, solenoid valves, selector switch, temperature control, fuses, circuit breaker, heaters, heater thermostatic switch, high and low pressure cutout switches, transformer, RFI filters, time delay relay and all internal wiring. The fan motors and the compressor are covered in separate sections.

3–40. Wiring Harnesses and Wire Leads

a. General. The electrical circuits in the air conditioner are completed by individual wire leads or by wire leads laced or enclosed in a loom to form a wiring harness. All of the wiring carries code numbers. When testing, repairing or replacing the wiring harness or individual wires, refer to the wiring diagrams, figure 1–4.

b. Inspection. Inspect all wiring installations for cracked or frayed insulation material. Pay articular attention to wires passing through oles in the frame or around sharp edges. Repair r replace defective wiring. Inspect electrical connectors and fittings for damage or broken condition. Replace defective connectors and fittings.

c. Testing. Test for continuity in leads or wiring harnesses by disconnecting each end. Where wires terminate in an electrical connector, disconnect connector from corresponding receptacle connector or plug connector. Touch the test probes of a continuity tester or multimeter set on low OHMS range to ends of wire or to corresponding pin of connector. If continuity is not indicated, repair or replace wire.

d. Repair. Remove insulation to expose 1/2 inch of bare wire on each side of break. Twist the wire ends together and solder the splice. Cover the splice with rubber or PVC electrical tape and friction tape making certain to cover all the repaired area. Replace broken terminal lugs with exact duplicates. To replace electrical connectors, unsolder wires from solder wells of inserts. Install new connector and insert ends of wires in solder wells. Solder wires in place. Check connections carefully. Refer to figure 1–4 for wiring diagram.

3–41. Control Panel

a. General. The control panel contains the selector switch and temperature control. The selector switch is a manually operated, five-position rotary switch which is used to turn on the "COOL", "HEAT" and "VENTILATE" modes and to turn off the air conditioner. The temperature control is a temperature sensing manually set single-pole double-throw switch which automatically controls both heating and cooling cycles to maintain any selected conditioned area temperature between +40°F and +90°F.

b. Removal. Refer to figure 3–20 and remove control panel.

Note. Use care in removing temperature control thermostat remote bulb and capillary tubing.

c. Disassembly. Refer to figure 3–21 and disassemble control panel in numerical sequence.

d. Testing Selector Switch. Using a multimeter set on OHMS, refer to figure 3–22 and test for continuity or open circuit as indicated on the chart. Replace the selector switch if it fails to operate as specified.

e. Testing Temperature Control.

(1) Rotate shaft so flat faces away from terminals. Using a multimeter set on OHMS, refer to figure 3–23 and test for continuity between each of the control terminals and the common terminal. It will be necessary to rotate the shaft clockwise ("warmer" direction) or counterclockwise ("cooler" direction) to open and close each set of contacts. Replace temperature control thermostat if contacts do not operate as indicated.

(2) The temperature control thermostat should maintain conditioned area temperature within 2° ±1°F of the temperature selected. Replace temperature control thermostat if operating differential is larger than specified.

f. Reassembly. Refer to figure 3–21 and assemble control panel in reverse of numerical sequence. Attach ground lead of wiring harness (22, fig. 3–21) between washers (17) on screw (14).

g. Installation. Refer to figure 3–20 and install control panel.

3–42. Junction Box

a. General. The junction box contains heater and motor relays, time delay relay, circuit breaker, fuses, leads, and terminal boards. The transformer is mounted on the top of the box and the RFI filter assembly is mounted on the back of the box.

b. Removal. Refer to figure 3–20 and remove junction box.

c. Testing and Repair. If troubleshooting procedures or faulty operation of the air conditioner indicate trouble in the junction box, check continuity of circuits, and inspect for loose or incorrect

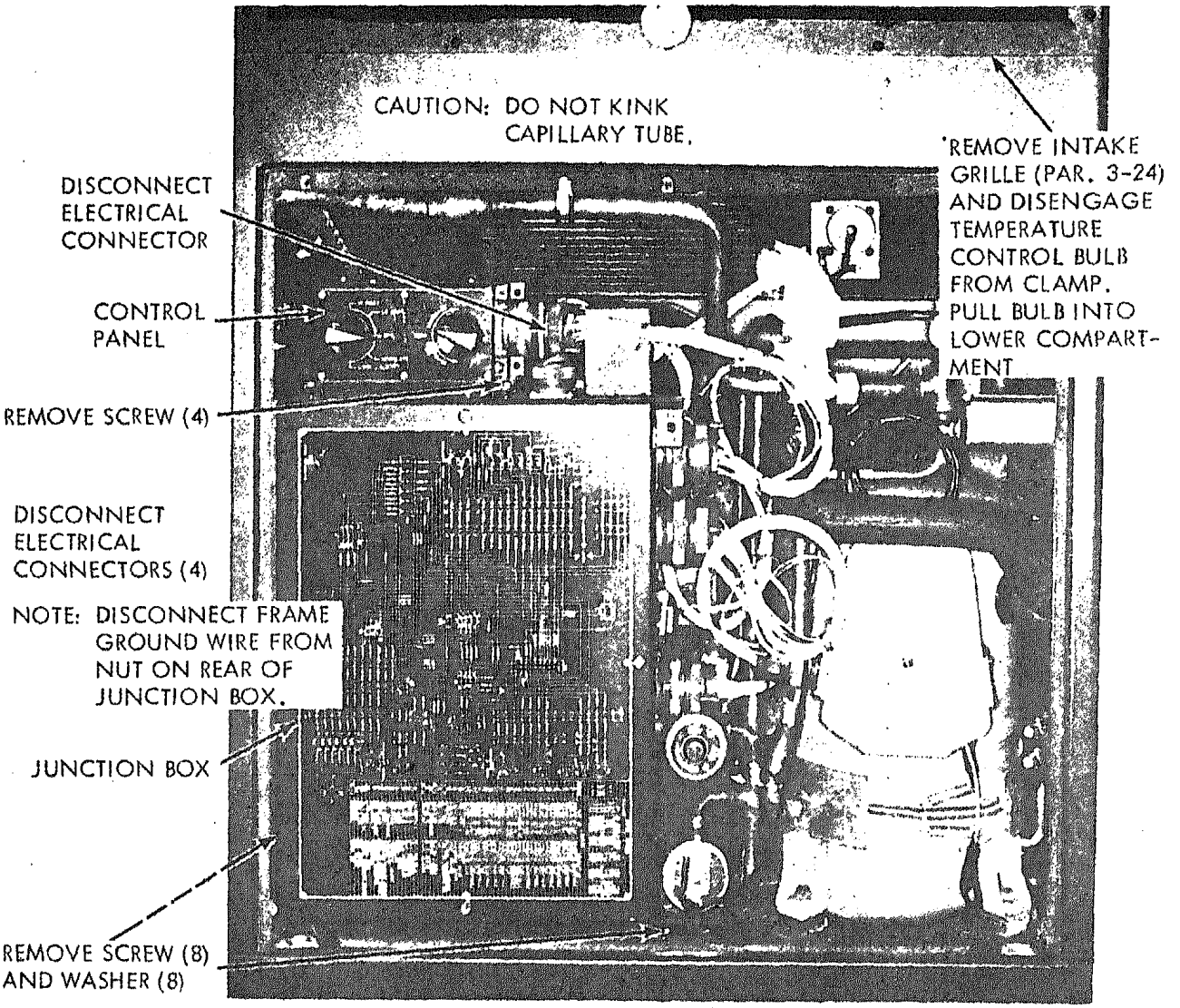


Figure 3-20. Control panel and junction box, removal and installation.

connections. Visually inspect leads for damage. Correct any deficiencies.

d. Replacement of Components. Tests and repair instructions for junction box components are contained in succeeding paragraphs. It is not necessary to remove the junction box assembly to replace individual components but it may be convenient to remove the box and move it to a suitable work bench.

Warning: **Do not perform any maintenance work on the junction box unless the air conditioner has been disconnected from the power source.**

e. Installation. Refer to figure 3-20 for installation instructions.

3-43. Fuses

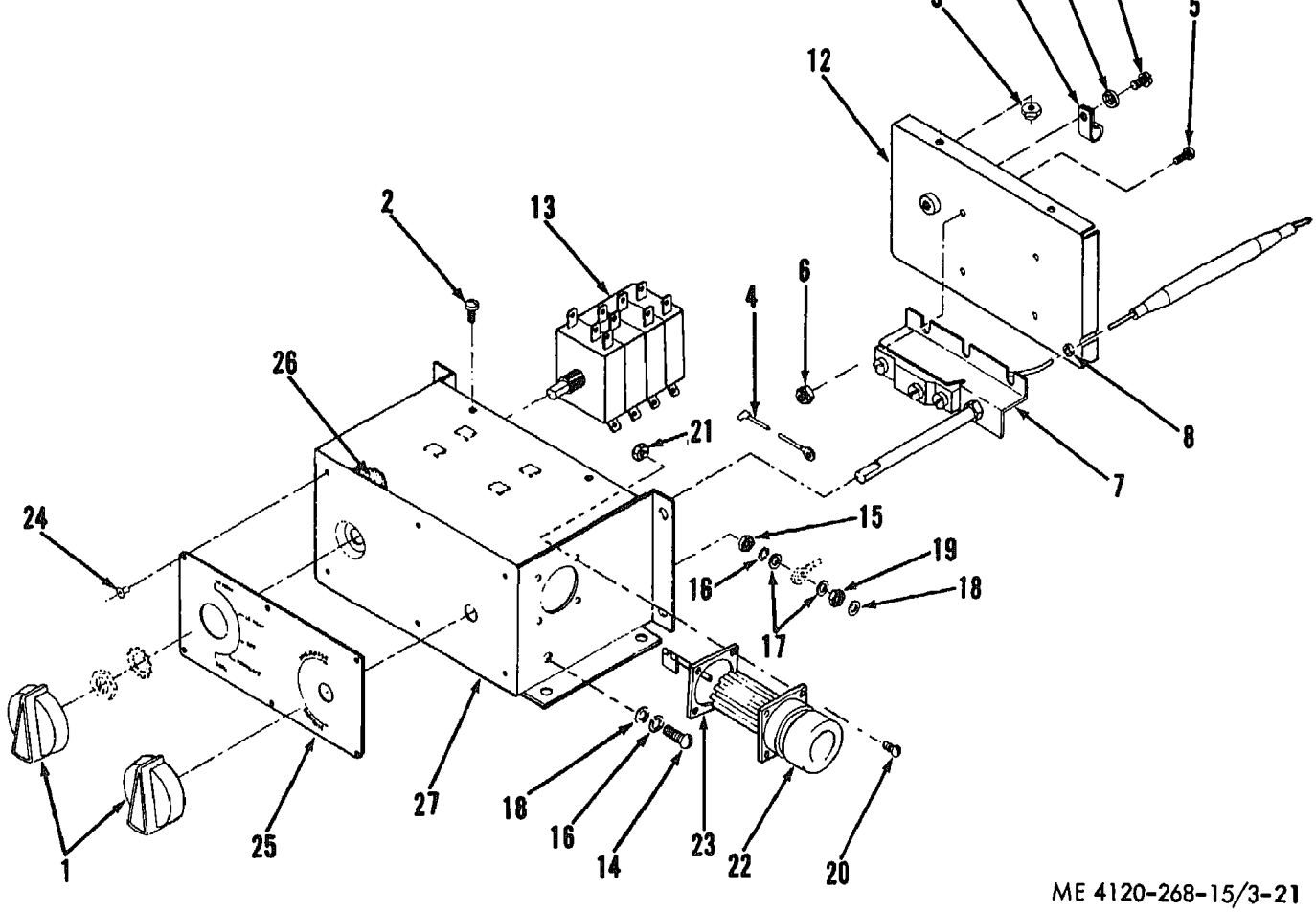
a. Removal. Refer to figure 3-24 and remove fuses.

b. Test. Test fuses for continuity. If fuse is open, replace fuse.

c. Installation. Refer to figure 3-24 and install fuses.

3-44. Circuit Breaker

a. General. The circuit breaker is a manually reset, double-pole double-throw switch which automatically protects the compressor motor from continuous overcurrent and short circuits. An electrically isolated single-pole double-throw switch protects the control circuits.



1 Knob
2 Screw, machine, pan head, No. 8–32 x 1/2 in. (4 rqr)
3 Nut, self-locking, hex, No. 8–32 (4 rqr)
4 Lead, electrical
5 Screw, machine, pan head, No. 8–32 x 1/2 in. (4 rqr)
6 Nut, self-locking, hex, No. 8–32 (4 rqr)
7 Temperature control
8 Grommet
9 Screw, machine, pan head, No. 10–32 x 1/2 in.
10 Washer, lock, No. 10
11 Clamp, loop
12 Plate, mounting
13 Switch, selector
14 Screw, machine, pan head, No. 1–32 x 1 in.
15 Nut, self-locking, hex, No. 10–32
16 Washer, lock, No. 10 (2 rqr)
17 Washer, flat, No. 10 (2 rqr)
18 Washer, flat, aluminum, No. 10 (2 rqr)
19 Nut, hex, No. 10–32
20 Screw, machine, pan head, No. 6–32 x 1 in. (4 rqr)
21 Nut, self-locking, hex, No. 6–32 (4 rqr)
22 Wiring harness
23 Spacer
24 Rivet, blind
25 Plate, instruction
26 Insulation
27 Panel assembly

Figure 3–21. Control panel, exploded view.

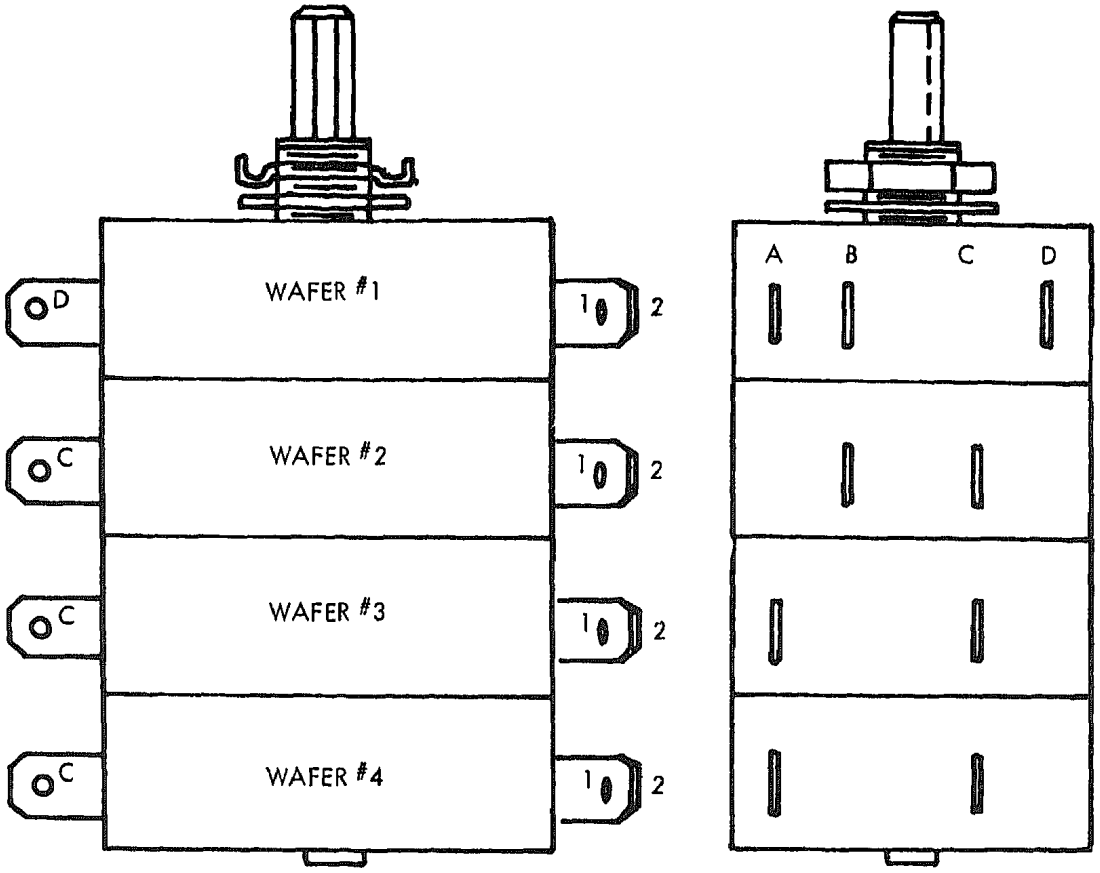
b. Removal. Refer to figure 3–24 and remove the circuit breaker from the junction box.

c. Testing.

(1) Refer to figure 3–25. With circuit breaker closed, there should be continuity between terminals 1 and 2, 3 and 5, 6 and 7.

(2) With circuit breaker open there should be no continuity between terminals 1 and 2, 3 and 5, 6 and 7. Replace circuit breaker if operation is not as indicated.

d. Installation. Refer to figure 3–24 and install circuit breaker in the junction box.



SWITCH POSITION						
	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/W1	2 & A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	2 & B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1 & D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/W2	2 & B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/W3	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/W4	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
	1 & C	CLOSED	OPEN	OPEN	OPEN	OPEN

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Figure 3–22. Selector switch test sequence.

3–45. Heater and Motor Relay

a. General. The heater and motor relays are remote controlled three-pole, single-throw switches which are used to connect the air conditioner electric motors and heaters across the line. The control coils operate on 24V DC provided by a step-down transformer and rectifier

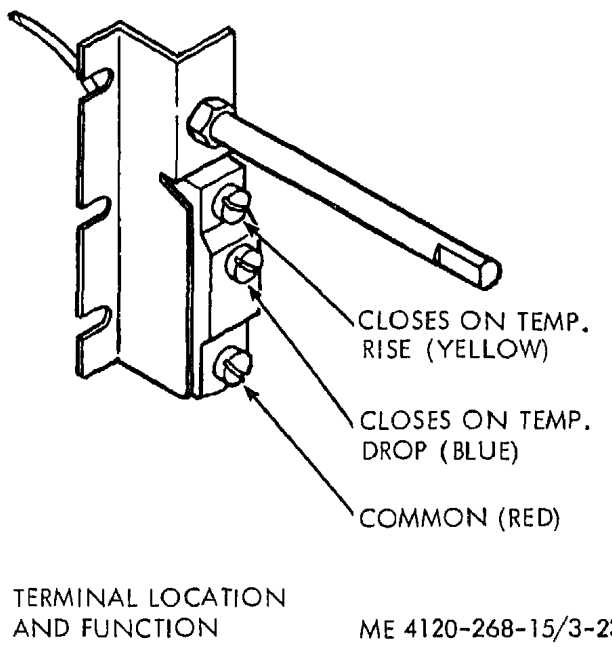


Figure 3-23. Temperature control test points.

circuit. The compressor motor relay is rated at 50 amperes. The evaporator fan motor, condenser fan motor and heater relays are rated at 25 amperes.

b. Removal. Refer to figure 3-24 and remove relays from the junction box.

c. Testing. See figure 3-26.

(1) *50-ampere relay.*

(*a*) With relay open, test for continuity across control coil terminals X_1 and X_2. If coil is open, replace relay.

(*b*) With relay open, test for continuity across each pair of line and load terminals L_1—T_1, L_2—T_2 and L_3—T_3. If continuity exists, contacts are welded or contact springs are broken, replace relay.

(*c*) Using a multimeter on high OHMS range, a megger or an insulation tester, test insulation resistance between relay frame and each terminal in turn. If insulation resistance is less than 0.5 megohm, replace relay.

Caution: **Do not apply test potentials in excess of 230 volts.**

(*d*) Energize control coil using a 24—28V DC source or two 12 volt batteries connected in series. Using a multimeter on lowest OHMS range, test contact resistance across each pair of line and load terminals L_1—T_1, L_2—T_2 and L_3—T_3.

(2) *25-ampere relays.* Proceed as instructed above, noting that line and load terminals are now A_1—A_2, B_1—B_2 and C_1—C_2. Observe same cautions.

d. Installation. Refer to figure 3-24 and install relays in junction box.

3-46. Time Delay Relay

a. General. The time delay relay is a hermetically enclosed, single-pole, single-throw normally open thermal delay relay which keeps the hot gas bypass valve open and prevents operation of the compressor for 30 seconds after the selector switch is placed on "COOL". The time delay relay closes at the end of the delay period and remains closed as long as the air conditioner is on "COOL" mode. Switching to other modes of operation opens the relay. It remains open until the air conditioner is again placed on "COOL" mode, at which time it delays valve and compressor operation as described above.

b. Removal. Refer to figure 3-24 and remove the time delay relay assembly from the junction box.

c. Disassembly. Do not disassemble for testing. If replacement is indicated, remove time delay relay from its mounting bracket by removing two screws and nuts. Disconnect electrical leads.

d. Testing.

(1) Refer to figure 3-27 and place an unpowered 24 volt test lamp across leads B and C.

(2) Apply 24—28V DC from a test source or two 12-volt batteries in series across leads A and C.

(3) Begin timing the relay from the instant DC power is applied until the test lamp lights indicating the relay contacts have closed. Normal delay is 27 seconds to 33 seconds. Replace time delay relay if delay time is not according to specifications.

e. Reassembly. Connect electrical leads to time delay relay and mount relay in its bracket. Secure relay to bracket with two screws and nuts.

f. Installation. Refer to figure 3-24 and install time delay relay in the junction box.

3-47. Transformer

a. General. The control circuit transformer is a single-phase, shielded, potted step-down transformer with a 208V AC primary and a 30V AC secondary. After rectification, the resulting 24V DC output is used to energize the motor and heater relays, solenoid valve control coils, and

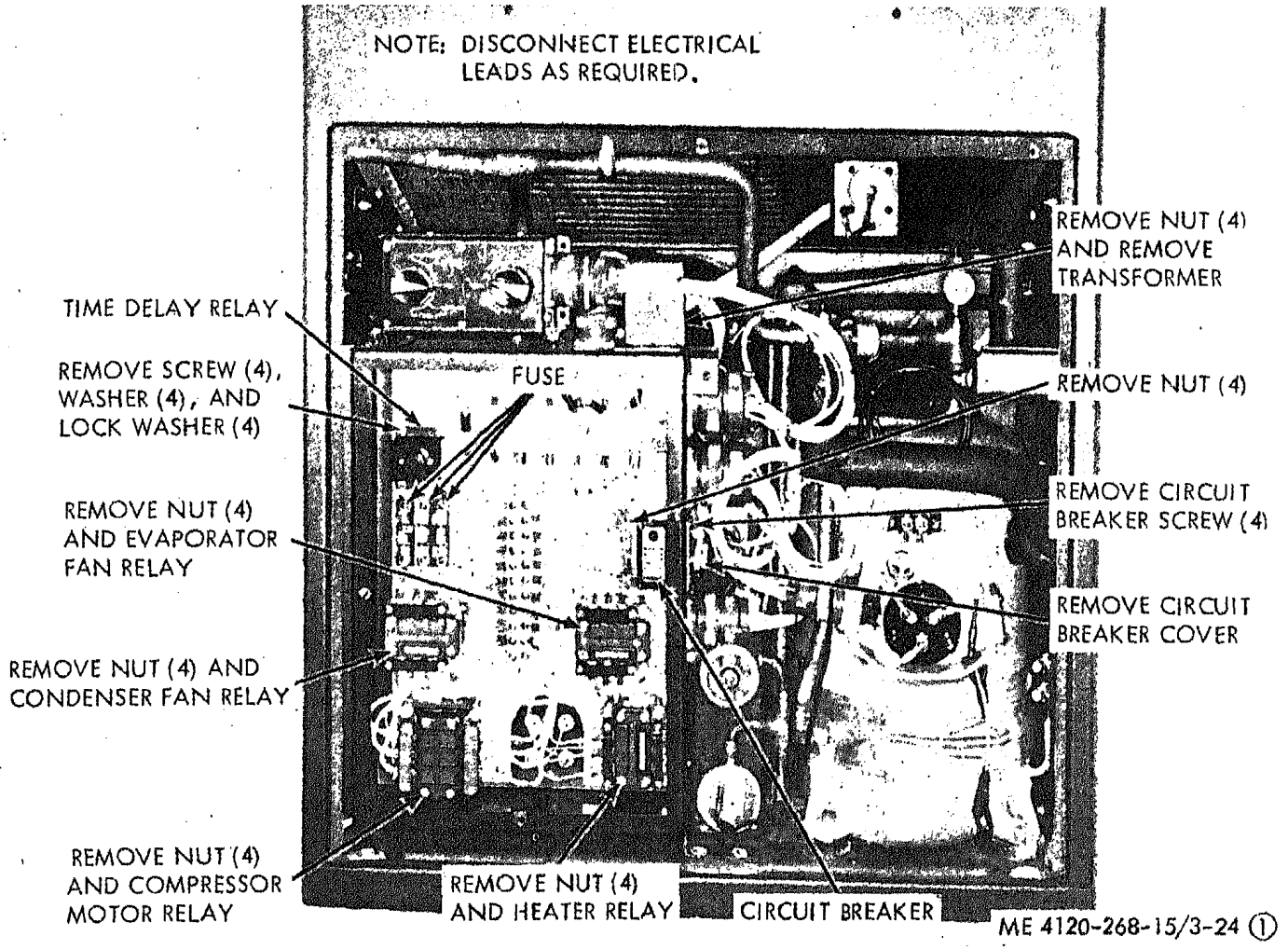


Figure 3–24. Junction box components, removal and installation (Sheet 1 of 2).

b. Removal. Refer to figure 3–24 and remove the transformer from the junction box.

c. Testing.

(1) Connect a continuity tester or multimeter on low OHMS range across the transformer primary winding. If winding is open, replace transformer.

(2) Connect a continuity tester or multimeter on low OHMS range across the transformer secondary. If winding is open, replace transformer.

(3) Connect an insulation tester, megger or multimeter on high OHMS range between one primary terminal and transformer case. If resistance is less than 0.5 megohm, replace transformer.

(4) Connect an insulation tester, megger or multimeter on high OHMS range between one primary terminal and one secondary terminal. If resistance is less than 0.5 megohm, replace transformer.

d. Installation. Refer to figure 3–24 and install transformer in the junction box.

3–48. Terminal Boards

a. General. Two terminal boards are installed on the junction box plate assembly. One board has ten terminals and the other six.

b. Removal. Refer to figure 3–24 and remove the terminal boards.

c. Inspection. Inspect the terminal boards for damaged screws and other damage. Replace terminal board if defective.

d. Installation. Install terminal boards (fig. 3–24).

3–49. Electrical Receptacles

a. General. Four receptacle connectors, each a part of a wiring harness, are attached to the junction box.

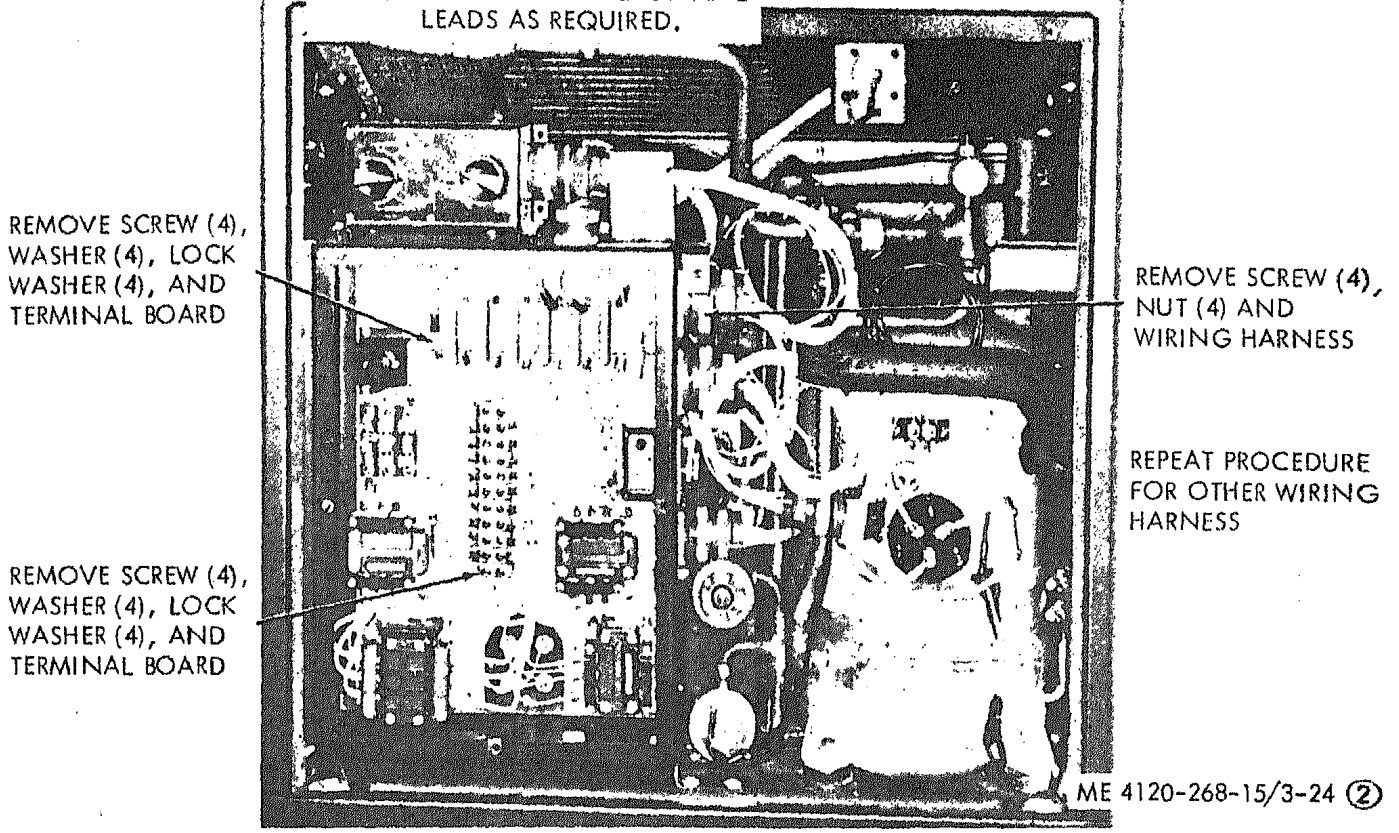


Figure 3–24. Junction box components, removal and installation (Sheet 2 of 2).

b. Removal. Refer to figure 3–24 and remove wiring harnesses as required.

c. Disassembly. Do not remove electrical leads from receptacle connectors unless inspection indicates replacement is necessary.

d. Inspection. Inspect for broken or cracked receptacle connectors. Inspect leads for loose connections and broken insulation. Check for continuity between connector contacts and corresponding lead terminals. Replace defective parts or wiring harness.

e. Assembly. Install leads in connector.

f. Installation. Install wiring harness (fig. 3–24).

3–50. Electric Heating Elements

a. General. Two banks of three electrical heaters each are mounted directly behind the evaporator coil, in the conditioned air stream, and provide heat on command from the temperature control thermostat to maintain the selected ambient temperature. Placing the selector switch on "LO HEAT" starts the evaporator blower and places one bank of heaters in operation on command from the temperature control thermostat. Placing the selector switch in "HI HEAT" activates the second bank of heaters, which operates continuously in addition to the controlled bank.

b. Removal. Refer to figure 3–28 and remove the heating elements from air conditioner.

c. Testing. Using a multimeter set on low OHMS range, check resistance across each heating element in turn. Normal reading is 12 ± 5 ohms. Replace heating element if resistance is not as specified.

d. Installation. Refer to figure 3–28 and install heating elements in air conditioner.

3–51. Heater Thermostatic Switch

a. General. The heater thermostatic switch is a three-pole, single-throw, automatic reset thermal overload and overcurrent protector which prevents the heaters from operating at discharge temperatures in excess of 190° ± 40°F regradless of selector switch and temperature control thermostat settings. Normal heater operation resumes

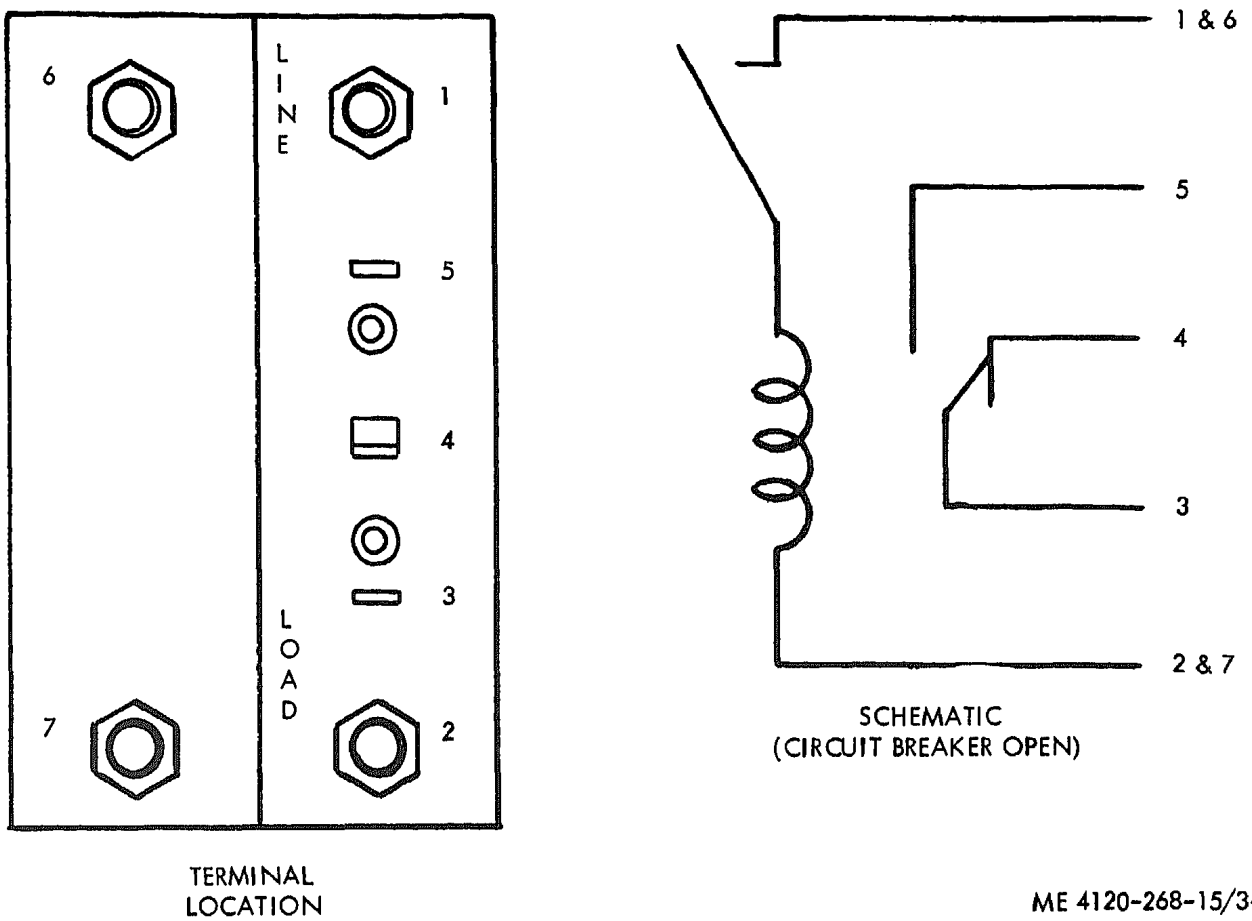


Figure 3-25. Circuit breaker test points.

automatically at 140° ± 40°F discharge air temperature.

Note. Normally, cutout temperature will be reached only if evaporator fan motor stops due to malfunction or if fans are damaged or seized.

b. Removal. Refer to figure 3-28 and remove the heater thermostatic switch.

c. Disassembly. Disconnect electrical leads from heater thermostatic switch. Do not disassemble further.

d. Testing. Using a continuity tester or a multimeter set on low OHMS range, test for continuity between each pair of terminals. Replace heater thermostatic switch if an open reading is obtained.

e. Reassembly. Connect electrical leads to heater thermostatic switch.

f. Installation. Refer to figure 3-28 and install heater thermostatic switch on heater support assembly.

3-52. Pressure Equalizer Solenoid Valve Coil

a. General. The pressure equalizer solenoid valve is a normally open, pilot operated valve which remains closed while the selector switch is on "COOL". The hot gas bypass valve opens whenever the selector switch is moved to another position, bypassing refrigerant gas under pressure in the discharge line to the compressor suction line. Moving the selector switch to "COOL" permits the hot gas bypass valve to close after the 30-second delay provided by the time delay relay.

b. On-Equipment Testing.

(1) Start the air conditioner. If the valve clicks closed, place hand on the downstream piping. If the piping begins to cool immediately, the valve is operating properly. If valve does not operate as specified, it must be replaced.

(2) If the hot gas bypass solenoid valve fails to click closed after a 30-second delay, stop the unit and check the electrical connection and the solenoid coil.

(3) Refer to figure 3-29 and disconnect the electrical plug connector. Test the solenoid control coil at the electrical receptacle connector, placing a continuity tester or a multimeter set on

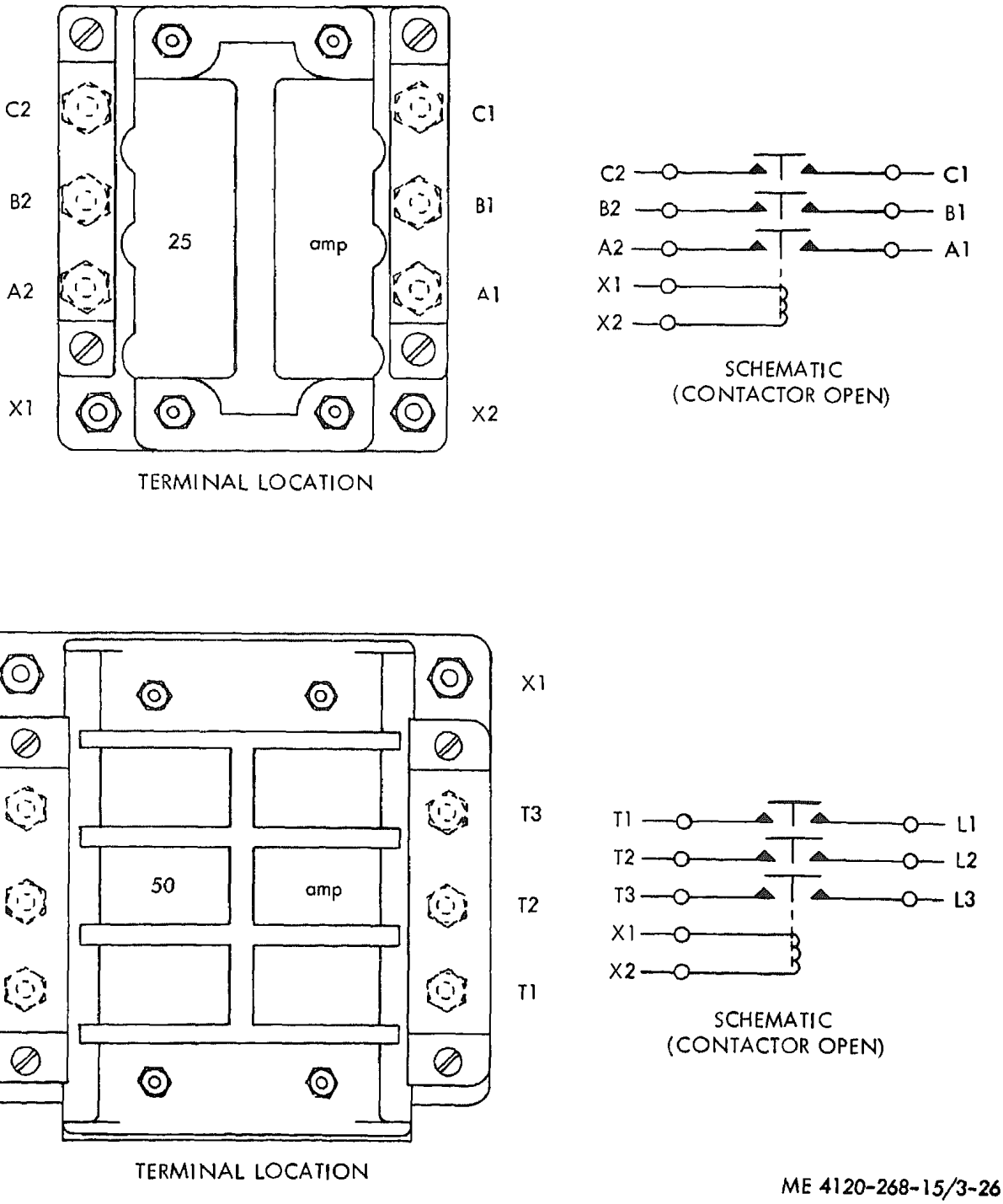


Figure 3-26. Heater and motor relays test points.

low OHMS range, across each pin. If continuity does not exist, replace control coil.

(4) Using a multimeter set on high OHMS range, measure resistance between one of the jack pins and the air conditioner frame. If resistance reading is less than 0.5 megohm, replace control coil.

c. Coil Removal. Refer to figure 3-29 and remove solenoid valve coil.

d. Coil Installation. Refer to figure 3-29 and install solenoid valve coil.

3-53. Liquid Line Solenoid Valve

a. General. The liquid line solenoid valve is a normally open pilot operated valve which automatically closes and opens on command from the air conditioner temperature control thermo-

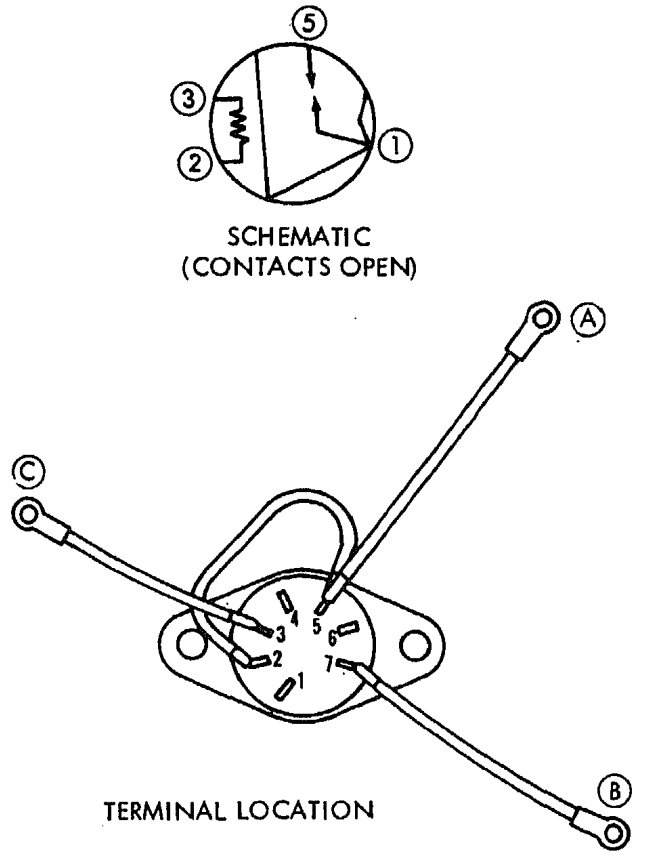


Figure 3–27. Time delay relay test points.

position. In the open position, the liquid line solenoid valve allows flow of liquid refrigerant from the condenser to the evaporator coil. In the closed position, the liquid line solenoid valve blocks the flow of liquid refrigerant to the evaporator coil.

b. On-Equipment Testing.

(1) Turn the temperature selector thermostat 5°—10°F below ambient temperature to assure refrigerant system will operate on the cooling cycle. Start air conditioner and place hand on the downstream piping. If the piping begins to warm immediately, the valve is operating properly. If valve does not operate as specified, it must be replaced.

(2) Turn temperature control thermostat 5°—10°F above ambient temperature to place refrigerant system on bypass cycle. The liquid line solenoid valve should immediately click closed. Place hand on the downstream piping. If the piping begins to cool immediately the valve is operating properly. If valve does not operate as specified, it must be replaced.

(3) If valve fails to click closed, stop air conditioner and test coil according to instructions in paragraph 3–52. Follow instructions in paragraph 3–52 for coil replacement.

3–54. High and Low Pressure Cutout Switches

a. Testing Switch Assembly. Refer to figure 6–10 and disconnect electrical connector from high and low pressure cutout switch assembly. Test for continuity across the connector pins with a multimeter set on OHMS. If no continuity is indicated, press the reset button and recheck. If no continuity is indicated check for loose connections and test individual switches.

b. Testing Switches. Refer to figure 6–10 and partially remove switches. Do not disconnect tubing nuts. Test each switch for continuity across switch terminals.

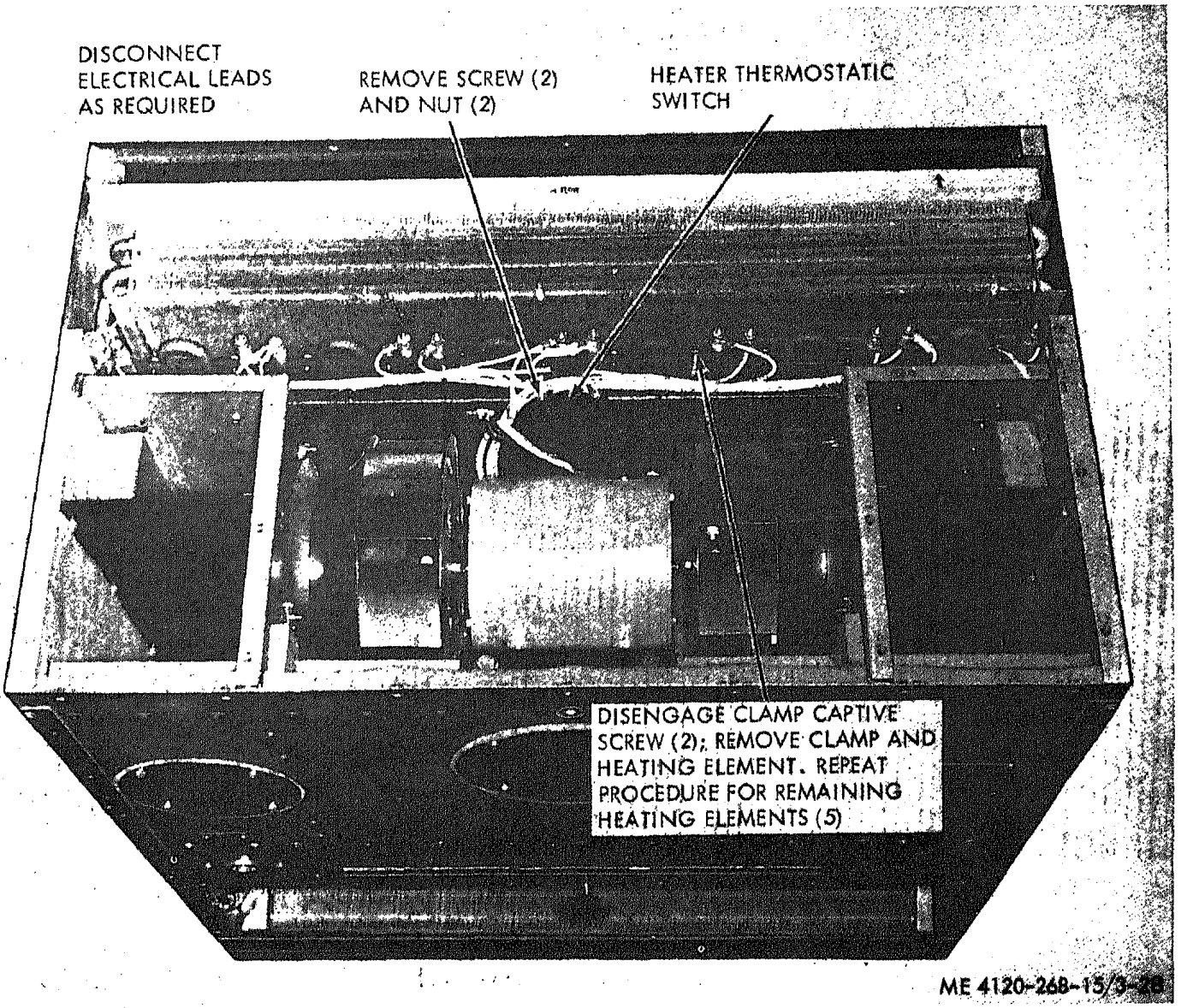


Figure 3–28. Heating elements and thermostatic switch, removal and installation.

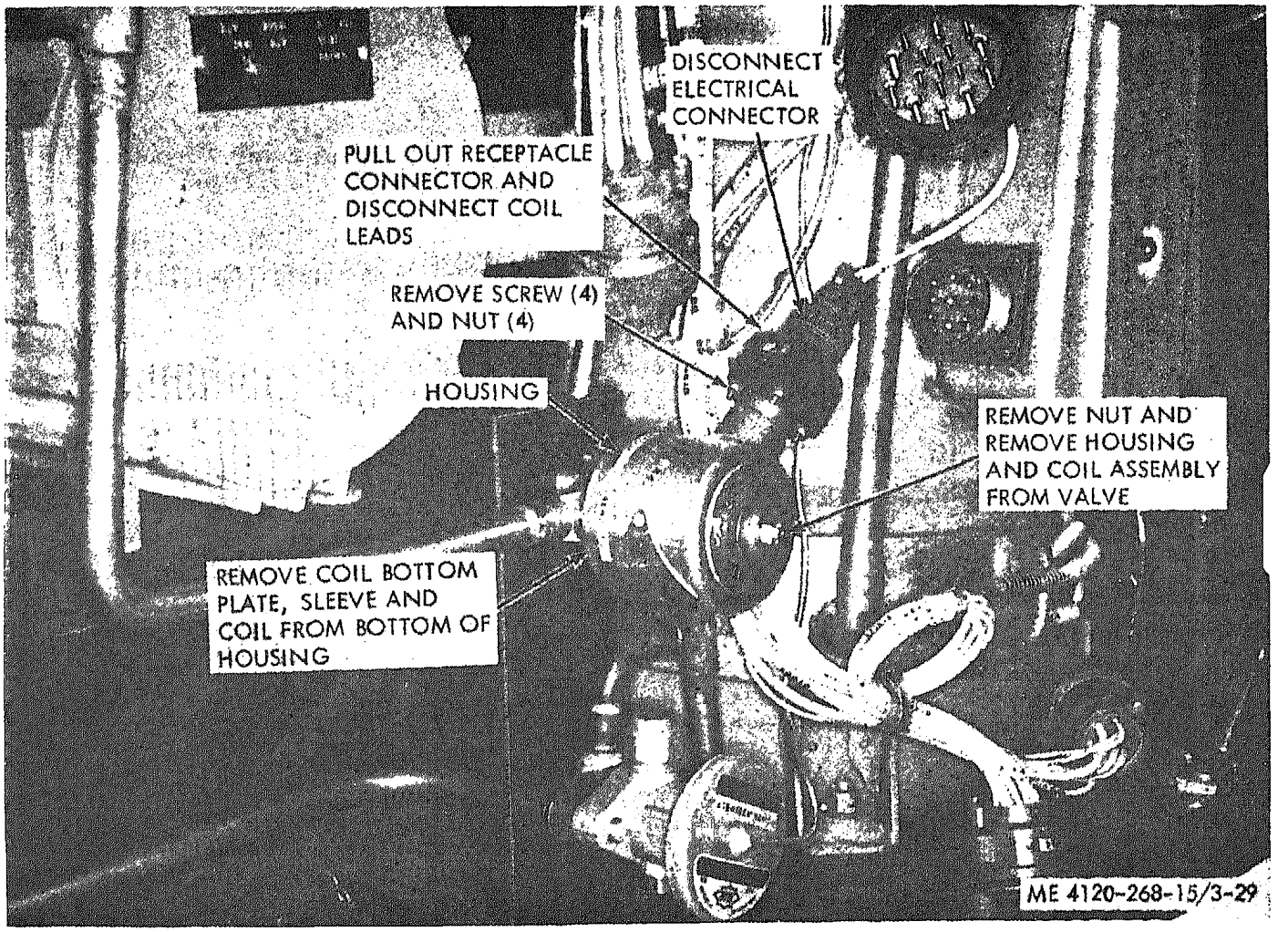


Figure 3-29. Solenoid valve coil, removal and installation.

Section XI. COMPRESSOR

3-55. General

The compressor and motor assembly is a hermetically sealed unit and is repairable in the field. If there is a mechanical failure in the compressor or a motor burnout, the entire compressor must be replaced. The motor may be tested without removing the compressor from the air conditioner.

3-56. Compressor Motor Test

a. Disconnect receptacle connector from compressor junction box.

b. Refer to wiring diagram and test continuity across each combination of two motor terminals. Lack of continuity indicates an open winding. Test for continuity between two overload protector contacts.

c. Place one contact of the tester against compressor housing and the other against the motor terminals one at a time. If a circuit is indicated, the motor is grounded.

d. Test the motor stator for insulation resistance as instructed in TM 5-764. The insulation resistance should measure not less than 0.5 megohms for the motor on either model.

e. Replace compressor if motor or overload protector is defective.

Note. The resistance measurement should be used only as a general guide, taking into consideration the accuracy of the instrument used, test lead resistance, and ambient temperature at time of test. If more precise measurement is required, an instrument such as a Kelvin or Wheatstone bridge should be used, or comparative measurement between the suspected component and a like item known to be good should be utilized. In all cases where a megohmmeter is used for testing, make certain that the unit is thoroughly dry. Wet condemnation tolerances should be considered.

3–57. Compressor Crankcase Heater

a. General. The compressor crankcase heater provides heat to prevent sludging and oil pumping problems when the compressor is exposed to low ambient temperatures. It is a 208 volt, 120 watt resistance heater enclosed within tubing and protected by a thermally insulated cover.

b. On-Equipment Test.

(1) Disconnect receptacle connector from compressor junction box and test for continuity between heater contacts.

(2) If an open circuit is indicated, remove compressor junction box cover. Disconnect crankcase heater and check for continuity in heater. If open, replace heater.

c. Removal. Refer to figure 3–30, and remove the crankcase heater.

d. Installation. Install in reverse order of removal as illustrated in figure 3–30.

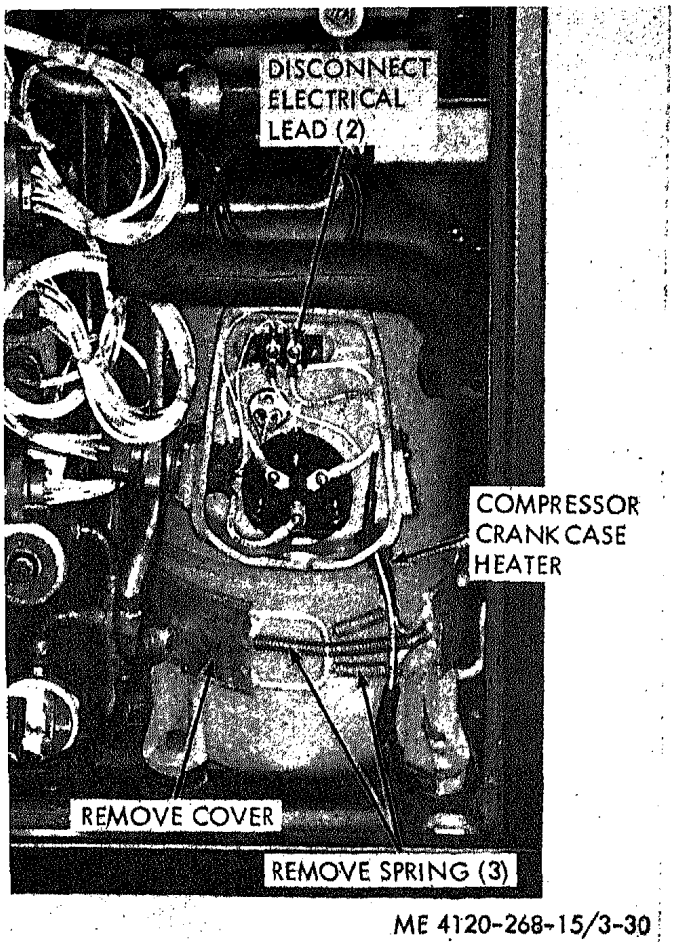


Figure 3–30. Compressor crankcase heater, removal and installation.

CHAPTER 4

DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

4–1. Scope

a. These instructions are published for the use of direct and general support and depot maintenance personnel maintaining the Trane Model MAC4V40–340–3 and MAC6V40–340–2 Air Conditioners. They provide information on the maintenance of the equipment, which is beyond the scope of the tools, equipment, personnel, or supplies normally available to using organizations.

b. Report all equipment improvements, recommendations as prescribed by TM 38–750.

4–2. Record and Report Forms

For record and report forms applicable to direct and general support and depot maintenance, refer to TM 38–750.

Note. Applicable forms, excluding Standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

Section II. DESCRIPTION AND TABULATED DATA

4–3. Description

For a complete descritpion of the air conditioner, see paragraph 1–3.

4–4. Tabulated Data

a. General. This paragraph contains all the overhaul data pertinent to direct and general support and depot maintenance personnel.

b. Air Conditioner Classification and Rating.

Model	MAC4V40–340–3	MAC6V40–340–2
Cooling capacity	36,000 BTU/H	36,000 BTU/H
Heating capacity:		
Hi-heat	33,000 BTU/H	30,000 BTU/H
Lo-heat	16,500 BTU/H	15,000 BTU/H
Ventilating capacity.	1,300 CFM	1,300 CFM
Operating Voltage.	208V AC	208V AC
Phase	3	3
Frequency	400 cycles	60 cycles
Current input, FL:		
Cooling	47 amperes	30 amperes
Hi-heat	27 amperes	26 amperes
Lo-heat	15 amperes	14 amperes
Ventilating	3.0 amperes	2.6 amperes
Power input:		
Cooling	10.9 KW	9.2 KW
Hi-heat	9.2 KW	9.1 KW
Ventilating	0.8 KW	0.7 KW

Note. Locked rotor (LR) current input is approximately 4 times full load (FL) current input.

c. Compressor Classification and Rating.

Type	Reciprocating piston, hermetically sealed.
Number of cylinders	2
Bore	2 inches
Stroke	31/32 inches
Displacement	6.00 cubic inches (approx.)
Lubrication	Forced feed
Crankcase capacity	4 pints
Crankcase heater	120 watts
Motor rating	4 HP
Motor protection	External circuit breaker and internal automatic reset thermal overload cutout.

d. Condenser Fan Motor Classification and Rating.

Type	Induction, squirrel cage rotor single shaft
Duty	Continuous
Drive	Direct

Protection	Automatic reset internal thermal overload and over current.	
Model	MAC4V40-340-3	MAC6V40-340-2
Rating	2.2 HP	1.7 HP
Voltage	208V AC	208V AC
Phase	3	3
Frequency	400 cycles	60 cycles
Speed	1900 rpm	1725 rpm

e. Evaporator Fan Motor Classification and Rating.

Type	Induction, squirrel cage rotor, double extended shaft.	
Duty	Continuous	
Drive	Direct	
Protection	Automatic reset internal thermal overload and overcurrent.	
Model	MAC4V40-340-3	MAC6V40-340-2
Rating	.90 HP	.70 HP
Voltage	208V AC	208V AC
Phase	3	3
Frequency	400 cycles	60 cycles
Speed	3600 rpm	3450 rpm

f. Electric Heaters Classification and Rating.

ype	Folded, stainless steel-sheathed tubular elements.
ating at 120V	1400 watts each
Duty	Continuous
Protection	Automatic reset external overload and overcurrent.

g. Temperature control Thermostat Classification and Rating.

Type	Single pole, double-throw, normally closed bimetallic element.
Range	+40°F to +90°F
Closing differential	2° ± 1°F

h. Selector Switch Classification and Rating.

Type	Rotary, five positive detent positions.
Rating	15 amperes at 208V AC

i. Heater Thermostatic Switch Classification and Rating.

Type	Automatic reset thermal overload and overcurrent, normally closed.
Range	Closed 140° ± 9°F; open 194° ± 9°F
Rating	180 amperes minimum at 208V AC

j. Relay Classification and Rating.

Type	Three-pole, single-throw, normally open, class A5.
Duty	Continuous
Control coil	28V DC
Rating:	
(1)	50 amperes at 208V AC (1 per unit)
(2)	25 amperes at 208V AC (3 per unit)

k. Time Delay Relay Classification and Rating.

Type	Single-pole, single-throw, normally open, thermal delay, hermetically sealed.
Delay	30 seconds ± 3 seconds
Rating	3 amperes at 28V DC

l. Circuit Breaker Classification and Rating.

Type	Manual reset double-pole, double-throw with single-pole, single-throw auxiliary.	
Trip time, main breaker:		
Locked rotor	1.5—6.0 seconds	
Rated overload	30 minutes maximum	
Rating, main breaker	MAC4V40-340-3	MAC6V40-340-2
Must hold	31.7 amperes	28.0 amperes
Must trip	39.2 amperes	32.2 amperes
Rating, auxiliary	2.5 amperes at 250VAC	

m. Transformer Classification and Rating.

Type	Stepdown, single phase
Input voltage	208V AC
Output voltage	30V AC
Output current	2.2 amperes continuous; 7.7 amperes surge.

n. Rectifier Classification and Rating.

Type	Silicon rectifier full-wave bridge, stud mount case.
Input voltage	30V AC
Output voltage	24V AC
Output current	3.0 amperes maximum

o. RFI Filter Classification and Rating.

Type	Feed through
Rating	5 amperes at 250V AC

p. Expansion Valve Classification and Rating.

Type	Compensated thermal expansion, remote bulb.
Superheat	3.6 ton—10° ± 1 1/4°F 2.1 ton—32° ± 1/2°F
Rating	3.6 tone (1 per unit) and 2.1 ton (1 per unit)

q. High Pressure Cutout Switch Classification and Rating.

Type	Manual reset, normally closed pressure operated single-pole, single-throw.
Trip pressure	450 ± 10 psig (pounds per square inch gage).
Reset pressure	400 psig

r. Low Pressure Cutout Switch Classification and Rating.

Type ..... Manual reset, normally closed pressure operated single-pole, single-throw.
Trip pressure ..... 7 ± 5 psig
Reset pressure ..... 12 ± 5 psig

s. Solenoid Valve Classification and Rating.

Type ..... Normally open, pilot operated with integral seat and resilient disc.
Coil voltage:
Pull-in ..... 20.4V DC
Release ..... 18.0V DC
Coil current ..... 0.51 amperes (holding)

t. Back Pressure Regulating Valve Classification and Rating.

Type ..... Pressure operated, normally closed.
Operating range ..... 0—90 psig
Opening pressure ..... 58 psig preset, adjustable.

u. Pressure Relief Valve Classification and Rating.

Type ..... Spring loaded, normally closed, non-adjustable.
Release pressure ..... 540 psig.

CHAPTER 5

GENERAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

5–1. Special Tools and Equipment

No special tools or equipment are required to perform direct and general support and depot maintenance on the air conditioner.

5–2. Specially Designed Tools and Equipment

No specially designed tools and equipment are required to perform direct and general support and depot maintenance on the air conditioner.

Section II. TROUBLESHOOTING

5–3. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner or any of its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause.

5–4. Compressor Fails to Start

Probable cause	Possible remedy
Defective selector switch	Test selector switch (para 3–41). Replace if defective.
Defective circuit breaker	Test circuit breaker (para 3–44). Replace if defective.
Defective compressor motor relay.	Test relay (para 3–45). Replace if defective.
Defective time delay relay	Test time delay relay (para 3–45). Replace if defective.
Defective compressor motor protective relay.	Test relay (para 3–56). Replace compressor if relay is defective (para 5–15).
Open or shorted control circuits.	Perform continuity tests (para 3–40). Repair or replace defective component.
Defective compressor motor	Test compressor or motor (para 3–56). Replace compressor if motor is defective (para 5–15).
Compressor damaged internally.	Replace compressor (para 5–15).
Defective control circuit transformer.	Test transformer (para 3–47). Replace if defective.
Defective control circuit rectifier.	Test rectifier (para 3–22). Replace if defective (para 3–21).
Defective RFI filters	Test filters (para 3–22). Replace if defective (para 3–21).
Shorted control coil in pressure equalizer bypass solenoid valve.	Test control coil (para 3–52). Repair or replace if defective.

5–5. Compressor Starts Normally, but Stops on Overload

Probable cause	Possible remedy
Incorrectly set or defective thermal expansion valves.	Set thermal expansion valves to correct superheat (para 6–5). Replace thermal expansion valves if correct adjustment cannot be obtained or if valves fail to modulate refrigerant flow correctly.
Defective liquid line or equalizer line solenoid valves.	Test control coils (para 3–52 and 3–53). Check valves for positive opening and closing. Replace solenoid valves if defective (para 6–6 and 6–7).
Bent or kinked refrigerant tubing.	Visually inspect all tubing for damage. Replace damaged sections (para 6–4).
Overcharge of refrigerant	Carefully open pressure line access valve with air conditioner operating and bleed excess refrigerant (para 6–16).

5–6. Reduced Cooling Capacity

Probable cause	Possible remedy
Dirty, clogged or damaged evaporator coil.	Clean evaporator coil (para 3–31). Repair or replace if damaged.
Evaporator coil frosting	Adjust back pressure regulating valve to specification (para 6–10). Replace valve if correct adjustment cannot be obtained.
Insufficient refrigerant in system.	Test, evacuate and recharge system (para 6–17 and 6–18).
Defective temperature control.	Test temperature control (para 3–41). Replace if defective.
Incorrectly set or defective thermal expansion valves.	Set valves to correct superheat (para 6–5). Replace valves if correct adjustment cannot be obtained or if valves fail to modulate refrigerant flow correctly.
Defective solenoid valves	Test control coils (para 3–52 and 3–53). Check valves for positive opening and closing. Replace defective valves (para 6–6 and 6–7).
Defective evaporator fan motor.	Test motor (para 3–37). Repair or replace if defective.

5–7. System Malfunction or Combination of Malfunctions

Probable cause	Possible remedy
Abnormal system operating pressures.	Perform operating pressure test (para 6–2).
LOW SUCTION PRESSURE	
Conditioned area temperature excessively low.	Raise thermostat temperature setting.
Restricted air flow over evaporator.	Clean evaporator coil (para 3–31), air filters (para 3–25) and grilles and screens.
Incorrectly set or defective expansion valves.	Set valves to correct superheat (para 6–5). Replace if defective.
Insufficient refrigerant	Test, evacuate and recharge system (para 6–17 and 6–18).
Restricted suction line	Replace damaged sections (para 6–4).
Incorrectly set or defective suction pressure regulating valve.	Set valve to specification (para 6–10). Replace if defective.
Defective compressor	Replace compressor (para 5–15).
HIGH SUCTION PRESSURE	
Conditioned area temperature excessively high.	Normal operation; self correcting as temperature drops.
Incorrectly set or defective expansion valves.	Set valves to correct superheat (para 6–5). Replace if defective.
Defective hot gas bypass solenoid valve.	Test valve (para 3–52). Replace if defective (para 6–6).
Defective compressor	Replace compressor (para 5–15).
LOW DISCHARGE PRESSURE	
Insufficient refrigerant	Test, evacuate and recharge system (para 6–17 and 6–18).
Defective compressor	Replace compressor (para 5–15).
HIGH DISCHARGE PRESSURE	
Restricted air flow over condenser.	Clean condenser coil (para 3–33) grilles and screens.
Incorrectly set or defective expansion valves.	Set valves to correct superheat (para 6–5). Replace if defective.
Defective solenoid valves	Test valves (para 3–52 and 3–53). Replace if defective (para 6–6 and 6–7).
Restricted discharge line	Replace damaged sections (para 6–4).
Excessive refrigerant	Bleed excess refrigerant (para 6–16).

5–8. Blower Motor Fails to Start or Stops on Overload

Probable cause	Possible remedy
Defective selector switch	Test selector switch (para 3–41). Replace if defective.
Defective fan motor relay	Test relay (para 3–45). Replace if defective.
Defective fan motor protective relay.	Test relay (para 3–37). Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3–40). Repair or replace defective component.
Defective fan motor	Test motor (para 3–37). Repair or replace if defective.
Defective control circuit transformer.	Test transformer (para 3–47). Replace if defective.
Defective control circuit rectifier.	Test rectifier (para 3–22). Replace if defective.
Defective RFI filters	Test RFI filters (para 3–22). Replace if defective.

5–9. No Heat in "Heat" Position

Probable cause	Possible remedy
Defective selector switch	Test selector switch (para 3–41). Replace if defective.
Defective temperature control.	Test temperature control (para 3–41). Replace if defective.

Probable cause	Possible remedy
Defective heater thermostatic switch.	Test heater thermostatic switch (para 3–51). Replace if defective.
Defective or damaged heater elements.	Test heaters (para 3–50). Replace if damaged or defective.
Defective heater relay	Test relay (para 3–45). Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3–40). Repair or replace defective component.
Defective control circuit transformer.	Test transformer (para 3–47). Replace if defective.
Defective control circuit rectifier.	Test rectifier (para 3–22). Replace if defective.
Defective RFI filters capacitors.	Test RFI filters (para 3–22). Replace if defective.

5–10. Reduced Heating Capacity

Probable cause	Possible remedy
Restricted air flow over heaters.	Clean evaporator coil (para 3–31), air filters (para 3–25 and 3–26) and grilles.
Defective selector switch ("LO HEAT" only).	Test selector switch (para 3–41). Replace if defective.
Defective temperature control.	Test temperature control (para 3–41). Replace if defective.
Defective or damaged heater elements.	Test heaters (para 3–50). Replace if damaged or defective.

5–11. Inoperative Compressor Crankcase Heater

Probable cause	Possible remedy
Defective or damaged heating element.	Test heater (para 3–57). Replace if damaged or defective.

Section III. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS OR AUXILIARIES

5–12. General

a. The air conditioner, after it is started, is automatic in operation. The relationship of the automatic components, controls, and instruments, is explained in the operating cycle description for maintenance of the air conditioner (para 5–13). A refrigerant flow diagram (fig. 5–1) and wiring diagrams (fig. 1–4) are included to assist in the maintenance of the electrical components, wiring harness, wire leads, and refrigerant components.

b. Generally, parts and assemblies may be removed for replacement from the air conditioner without the necessity of removing a major assembly of which it is a component. The electrical system and the refrigerant piping system, each consisting of a number of components connected together to form the system, cannot be removed as complete units. Repair and replacement of components are covered in chapter 6 except as noted in *c* below.

c. Removal and installation procedures for the evaporator coil, condenser coil, compressor, casing, and base are contained in this chapter.

Warning: **Disconnect the air conditioner from the power source before performing any maintenance on the components of the unit.**

5–13. Description of Operating Cycle

a. General. The type and degree of air conditioning provided by the unit is controlled by a five-position selector switch and a temperature control.

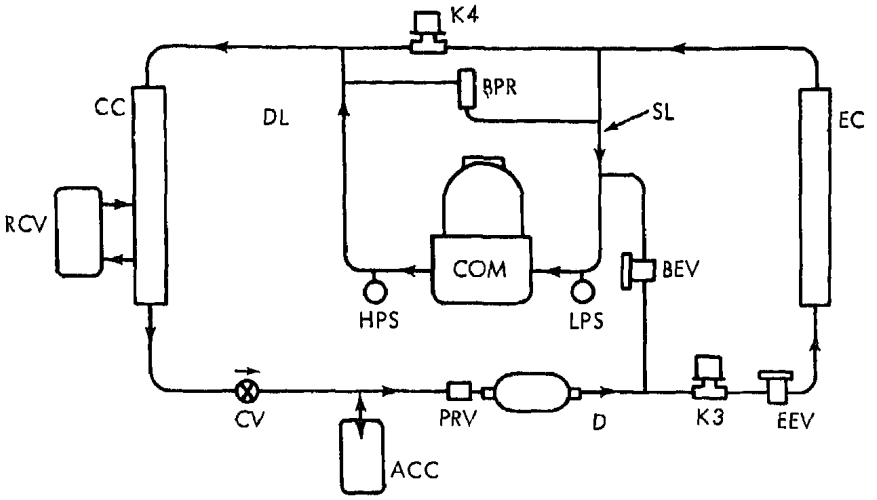
(1) The compressor crankcase heater is in constant operation to prevent sludging and oil pumping problems.

(2) Placing the selector switch in the HI-HEAT position actuates the blower motor with both banks of evaporator heaters being under the control of the temperature control. If the air temperature falls below the set point of the temperature control the control contacts close, energizing contactors which supply power to the heaters through the normally closed contacts of the heater thermostatic switch.

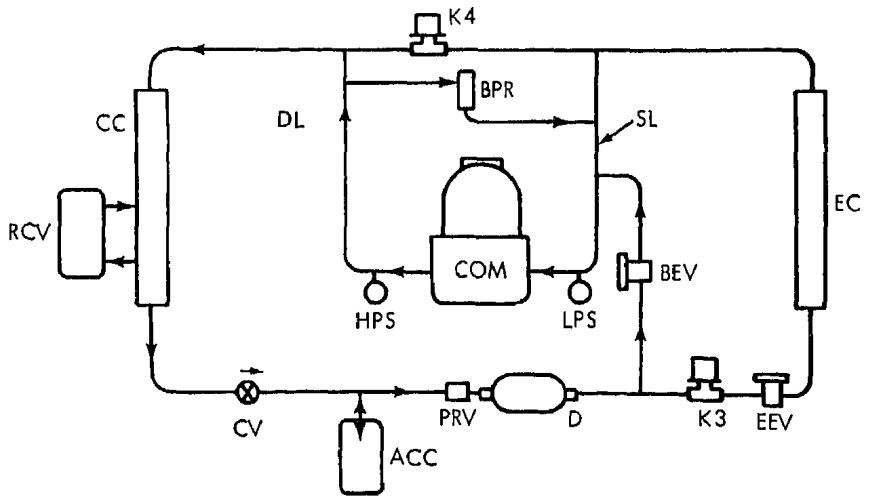
(3) Moving the selector switch to the LO-HEAT position presents the same control sequence but reduces the heating capacity of the unit by supplying power to a single bank of heaters only.

(4) The blower motor starts when the selector switch is placed in the VENTILATE position.

(5) In the "COOL" position, the blower motor is in operation and the compressor motor contactor is energized through the normally closed contacts of the circuit breaker and the compressor overload protector. After the blower motor and compressor have started, the flow within the refrigerant system is controlled by the temperature control thermostat. Sensing a rise in the air temperature above the set point, the temperature control thermostat closes, positioning



A. COOLING CYCLE OF OPERATION



B. BYPASS CYCLE OF OPERATION

DEVICE LEGEND

ACC	ACCUMULATOR	EEV	EVAPORATOR FEED THERMAL EXPANSION VALVE
BEV	BYPASS THERMAL EXPANSION VALVE	K3	LIQUID LINE SOLENOID VALVE
BPR	BACK PRESSURE REGULATOR VALVE	K4	PRESSURE EQUALIZER SOLENOID VALVE
CC	CONDENSER COIL	PRV	PRESSURE RELIEF VALVE
COM	COMPRESSOR	RCV	RECEIVER
CV	CHECK VALVE	SL	SUCTION LINE
D	DEHYDRATOR	S5	HIGH PRESSURE CUTOUT SWITCH
DL	DISCHARGE LINE	S6	LOW PRESSURE CUTOUT SWITCH
EC	EVAPORATOR COIL		

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Figure 5-1. Refrigerant flow diagram

the valves for cooling service. Sensing a fall in the air temperature below the set point, the contacts of the temperature control thermostat open, positioning the valves for bypass service.

b. Compressor Operation. The compressor delivers refrigerant gas to the condenser at the correct pressure and temperature required for condensation. A system of solenoid and expansion valves directs the liquid refrigerant to the evaporator coil for conditioned area cooling. When the desired temperature is attained, the same valves bypass the evaporator coil to prevent further cooling of the conditioned area. The compressor operates continuously whenever the selector switch is on "COOL" to prevent voltage fluctuations in the power line. A time delay relay keeps the hot gas bypass valve open and prevents operation of the compressor for 30 seconds after initial startup.

Note. Pressure equalizer solenoid valve K_4 remains closed at all times during cooling cycle and bypass cycle operation. It opens when the selector switch is moved from "COOL" position and remains open for 30 seconds after selector switch is returned to "COOL" position.

c. Cooling Cycle of Operation. When the conditioned area temperature rises above the temperature control thermostat setting, a set of contacts opens, permitting liquid line solenoid valve K_3 to return to its normally open position. Liquid refrigerant is metered to the evaporator coil by thermal expansion valve EEV. Thermal expansion valve BEV bypasses a small amount of liquid refrigerant to the suction line to maintain a constant load on the compressor. The back pressure regulating valve (BPR) prevents evaporator coil icing and loss of efficiency. The condenser receiver and accumulators further stabilize the system.

d. Bypass Cycle of Operation. When the conditioned area temperature falls below the temperature control thermostat setting, a set of contacts closes, energizing the pull-in coil of liquid line solenoid valve K_3 and blocking the flow of liquid refrigerant to the evaporator coil. Suction pressure increases and the back pressure regulating valve (BPR) opens to bypass hot refrigerant gas to the suction line. At the same time, thermal expansion valve BEV meters increased amounts of liquid refrigerant into the suction line to maintain a constant load on the compressor. The condenser receiver and accumulators further stabilize the system.

e. Heating Operation. Placing the selector switch in the "LO HEAT" position actuates half of the evaporator heaters mounted in the conditioned air stream, directly behind the evaporator coil. When the selector switch is placed in the "HI HEAT" position, the remaining heaters are energized, providing maximum heating capacity.

5-14. Evaporator Coil

a. Removal. Refer to figure 5-2 and remove evaporator coil.

b. Installation. Refer to figure 5-2 and install evaporator coil.

5-15. Compressor

a. Removal. Refer to figure 5-3 and remove compressor.

***Caution:* If compressor is being replaced because of a motor burnout, flush the system (para 6-19). Failure of the replacement compressor will occur if all of the contaminants are not removed.**

b. Installation. Refer to figure 5-3 and install compressor.

5-16. Condenser Coil

a. Removal. Refer to figure 5-4 and remove condenser coil.

b. Installation. Refer to figure 5-4 and install condenser coil by reversing removal procedures.

5-17. Base

a. Removal. Refer to figure 5-5 and remove base.

b. Installation. Refer to figure 5-5 and install base.

5-18. Casing Assembly

a. General. All components and parts of the air conditioner are mounted on or enclosed by the casing. Replacement of the casing assembly requires the removal of all components of the air conditioner that are not part of the casing assembly. In general, groups of parts and assemblies should be removed with as little disassembly as possible for convenience and safety in handling. As replacement of the casing assembly will usually be accomplished in connection with repair and replacement of other parts and assemblies, the exact procedure will vary.

b. Casing Subassembly. The casing assembly consists of the welded and riveted casing subassembly and rubber type thermal insulation cemented to the casing inner walls.

(1) To remove insulation from casing subassembly, refer to figure 5-6.

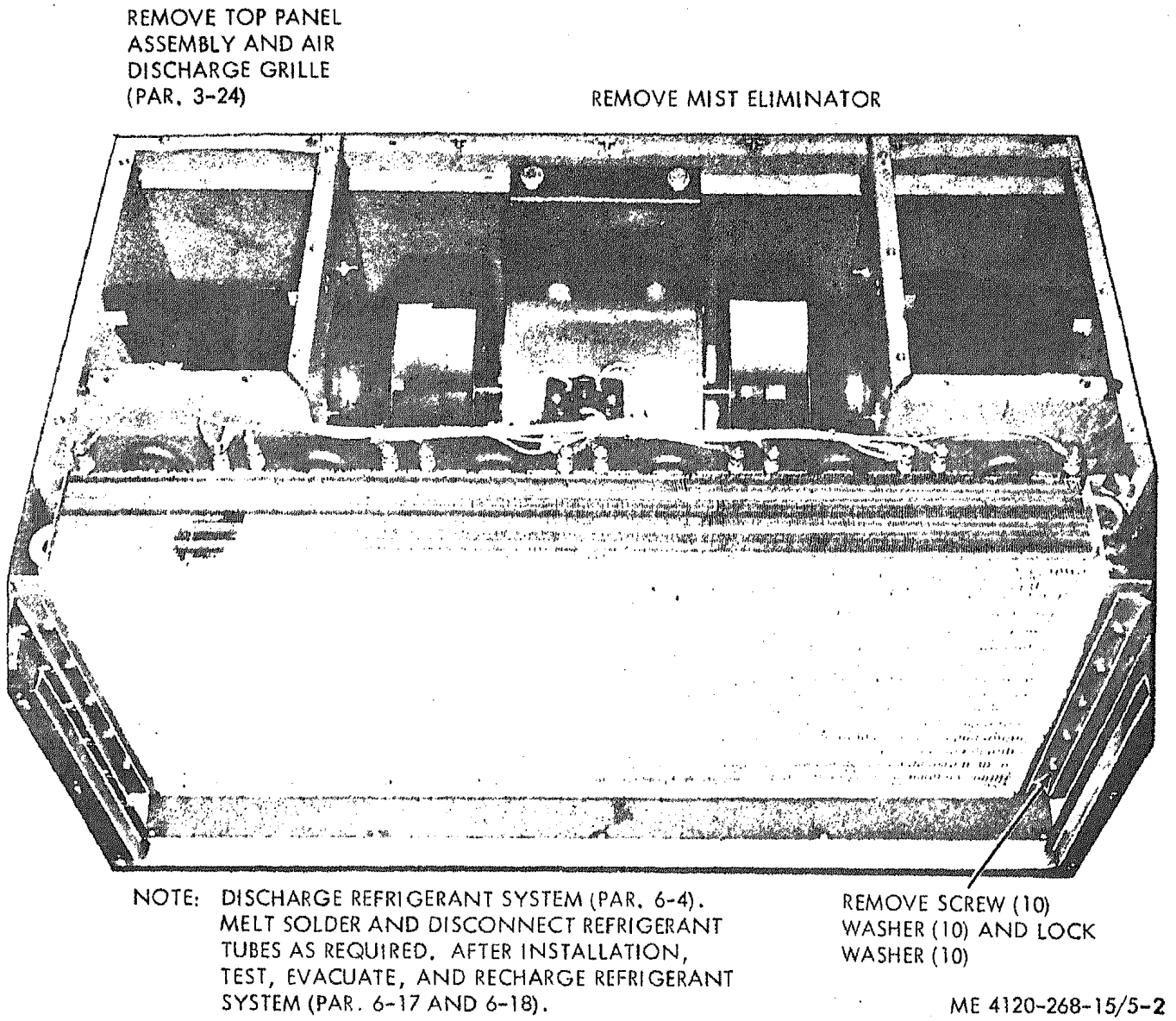
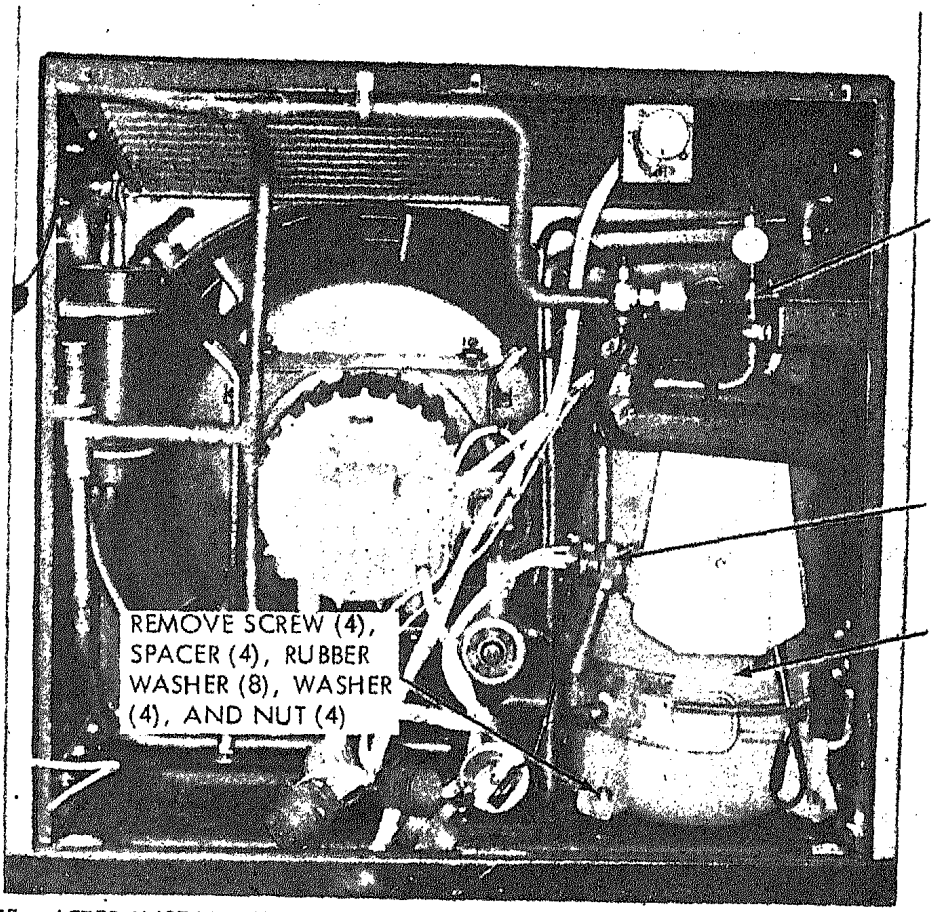


Figure 5-2. Evaporator coil, removal and installation.

(2) To install insulation, refer to figure 5-6 and cement new pieces of insulation in place as required. Apply adhesive to metal and insulation. Apply adhesive to insulation on side opposite skin side. Allow adhesive to dry until slightly tacky. Press or roll down to avoid trapped air.



NOTE: AFTER INSTALLATION, TEST, EVACUATE AND RECHARGE REFRIGERANT SYSTEM (PAR. 6-17 AND 6-18).

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Figure 5-3. Compressor, removal and installation.

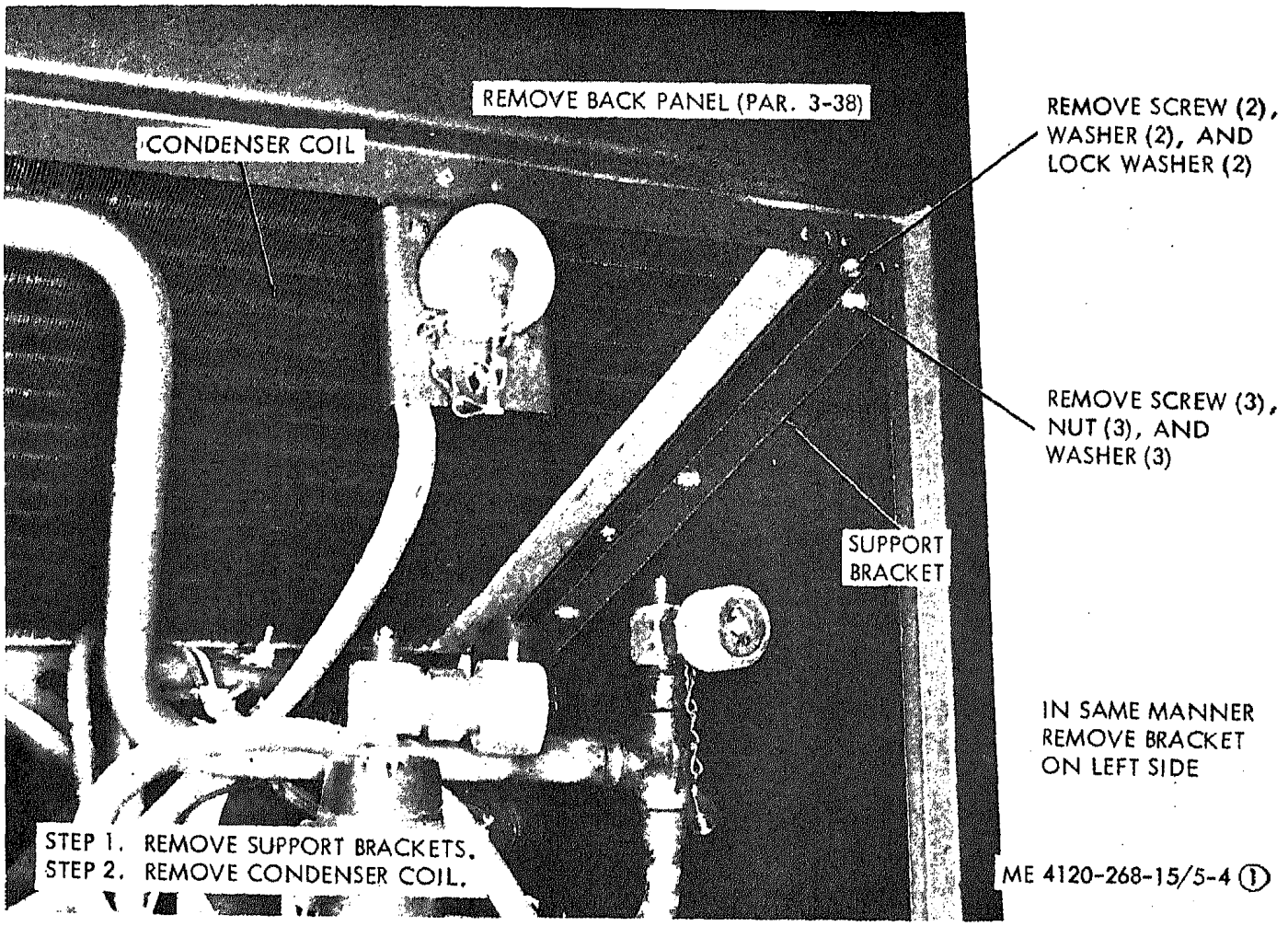


Figure 5-4. Condenser Coil, removal and installation (Sheet 1 of 2).

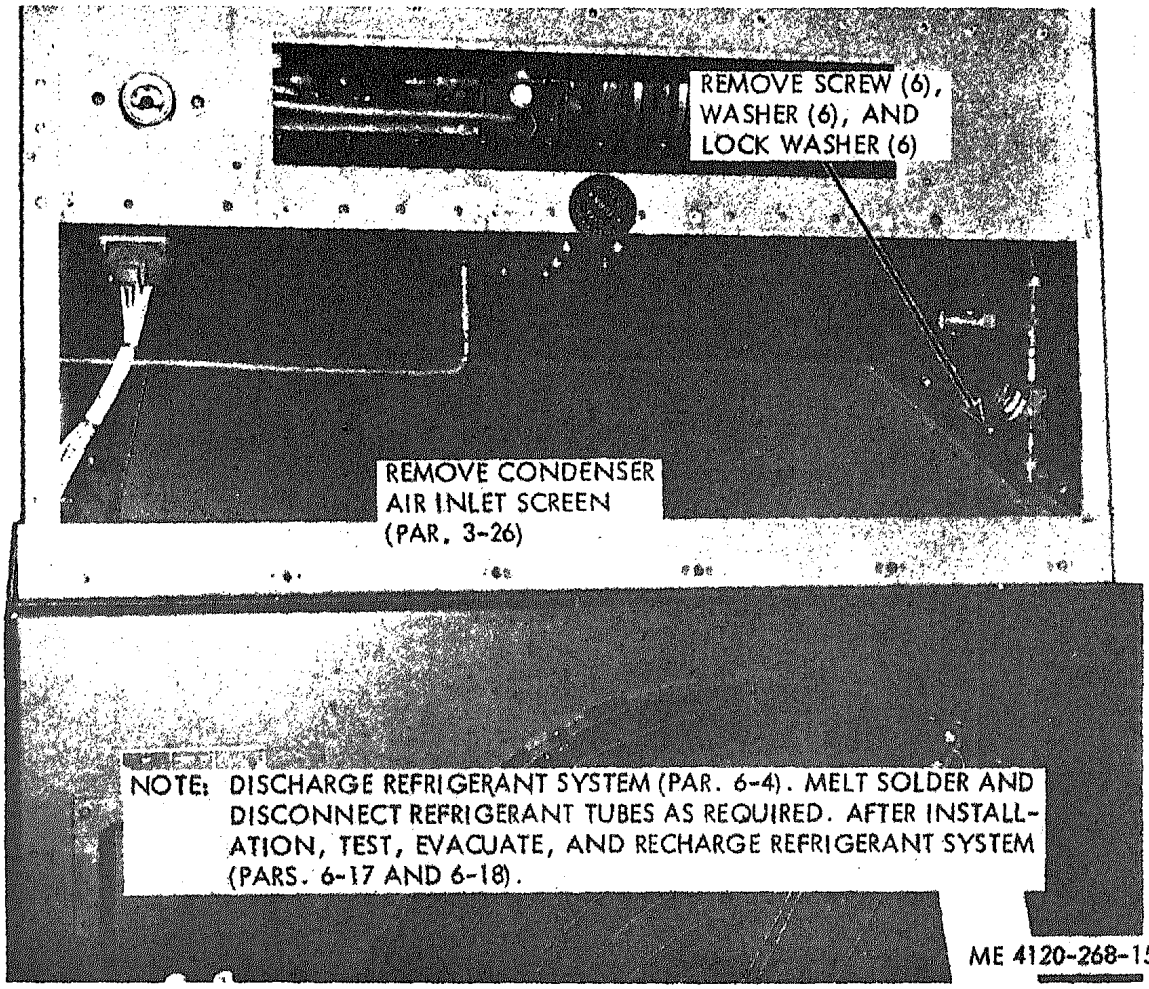


Figure 5-4. Condenser coil removal and installation (Sheet 2 of 2).

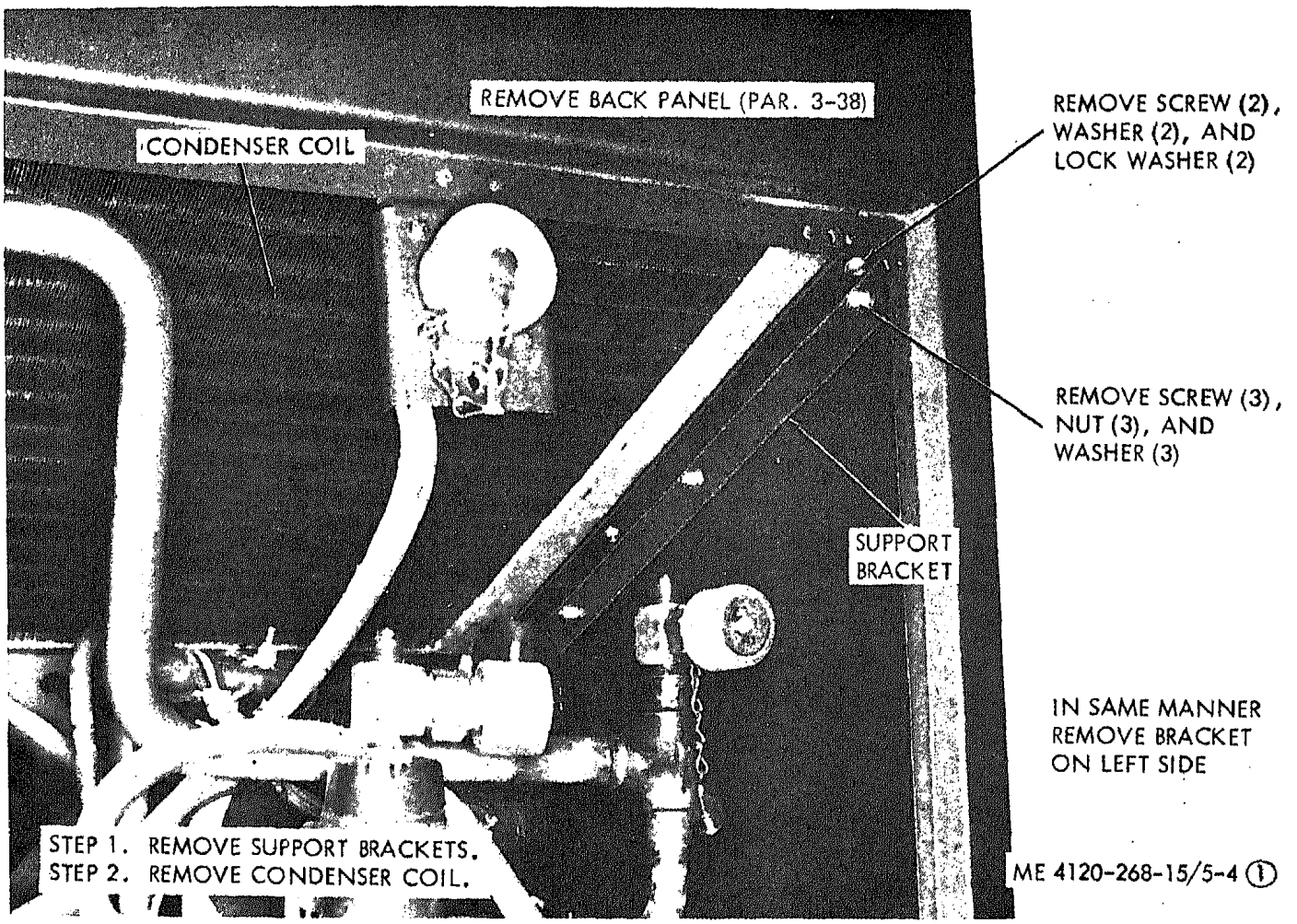


Figure 5-4. Condenser Coil, removal and installation (Sheet 1 of 2).

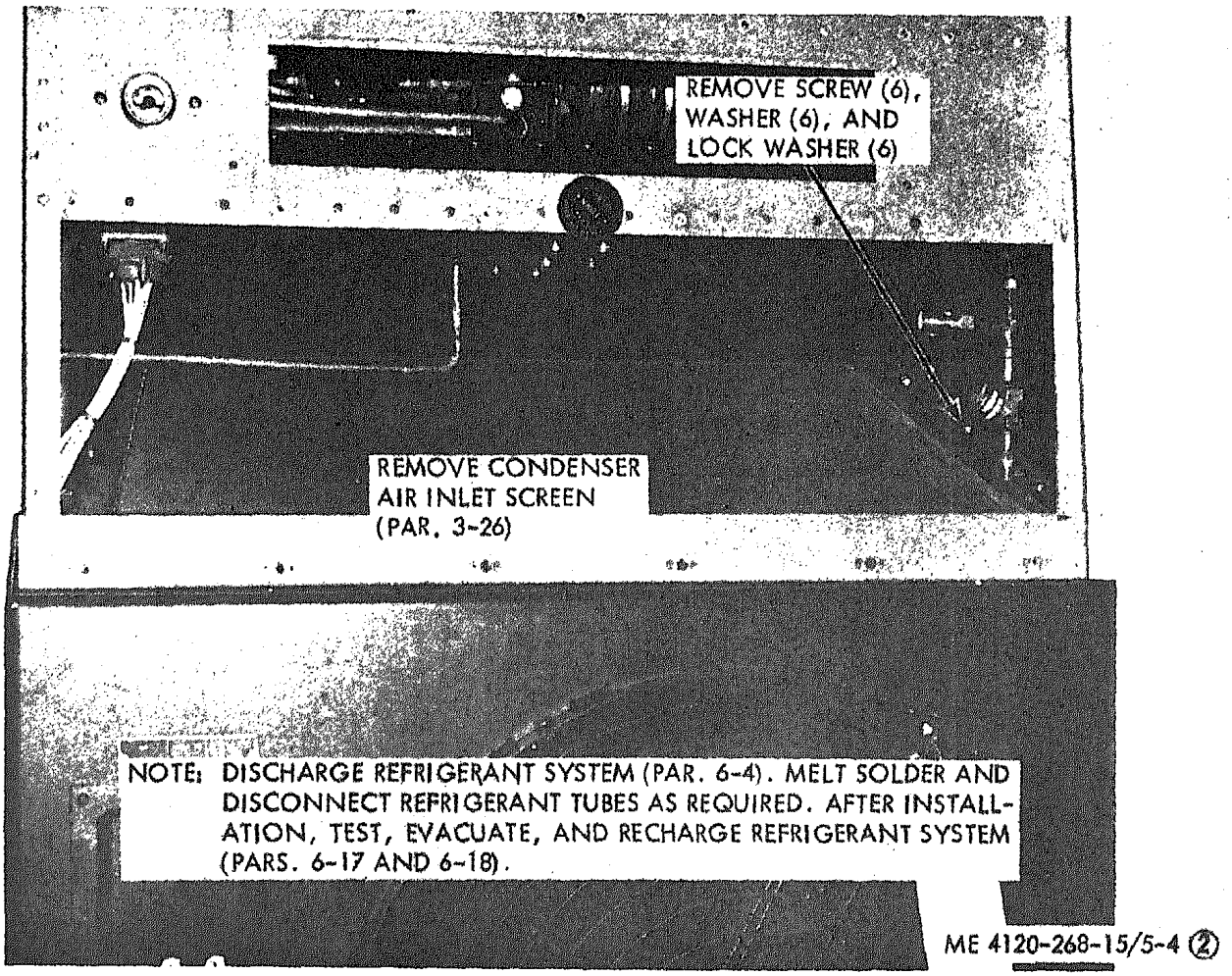


Figure 5-4. Condenser coil removal and installation (Sheet 2 of 2).

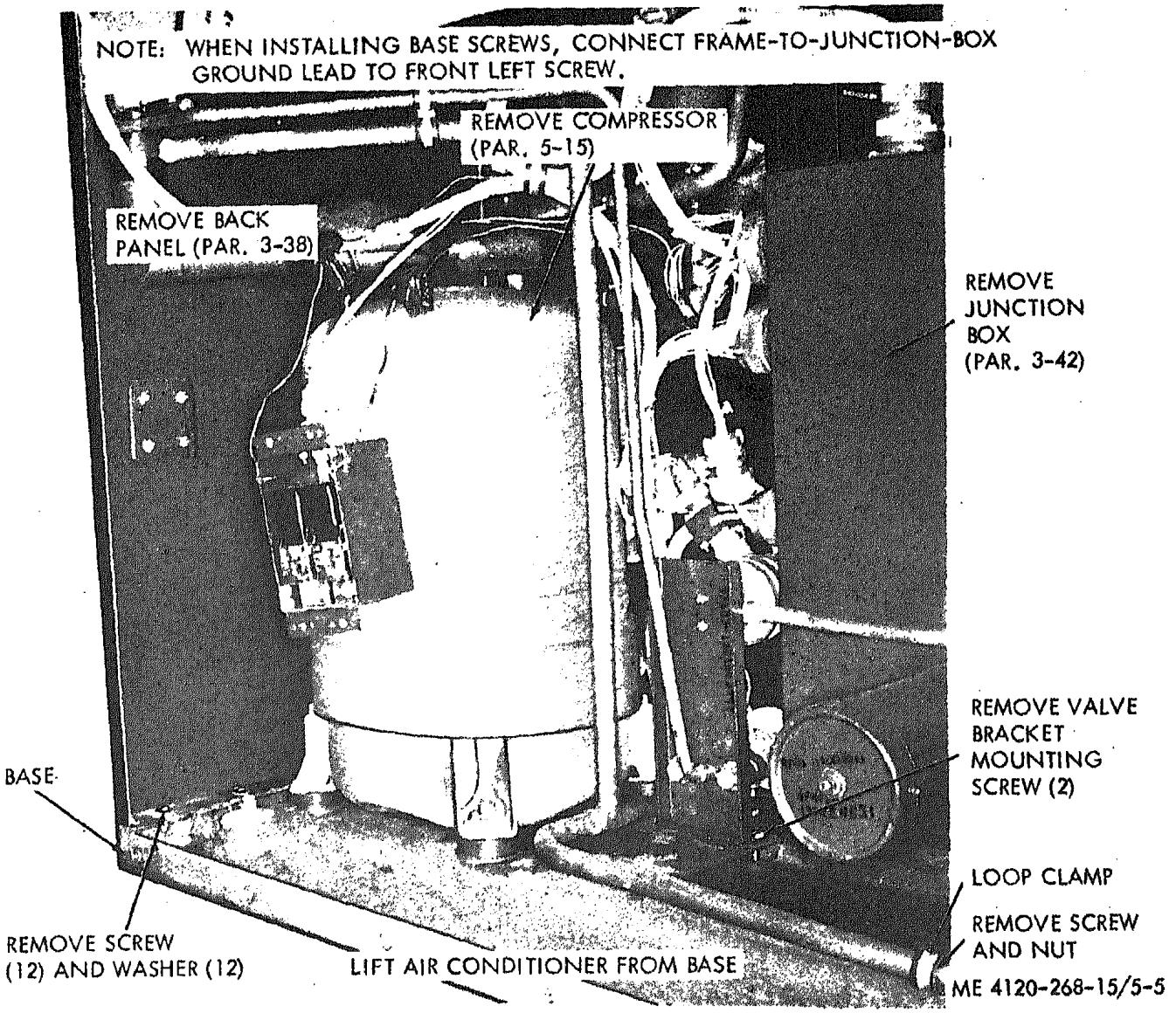


Figure 5-5. Air conditioner base, removal and installation.

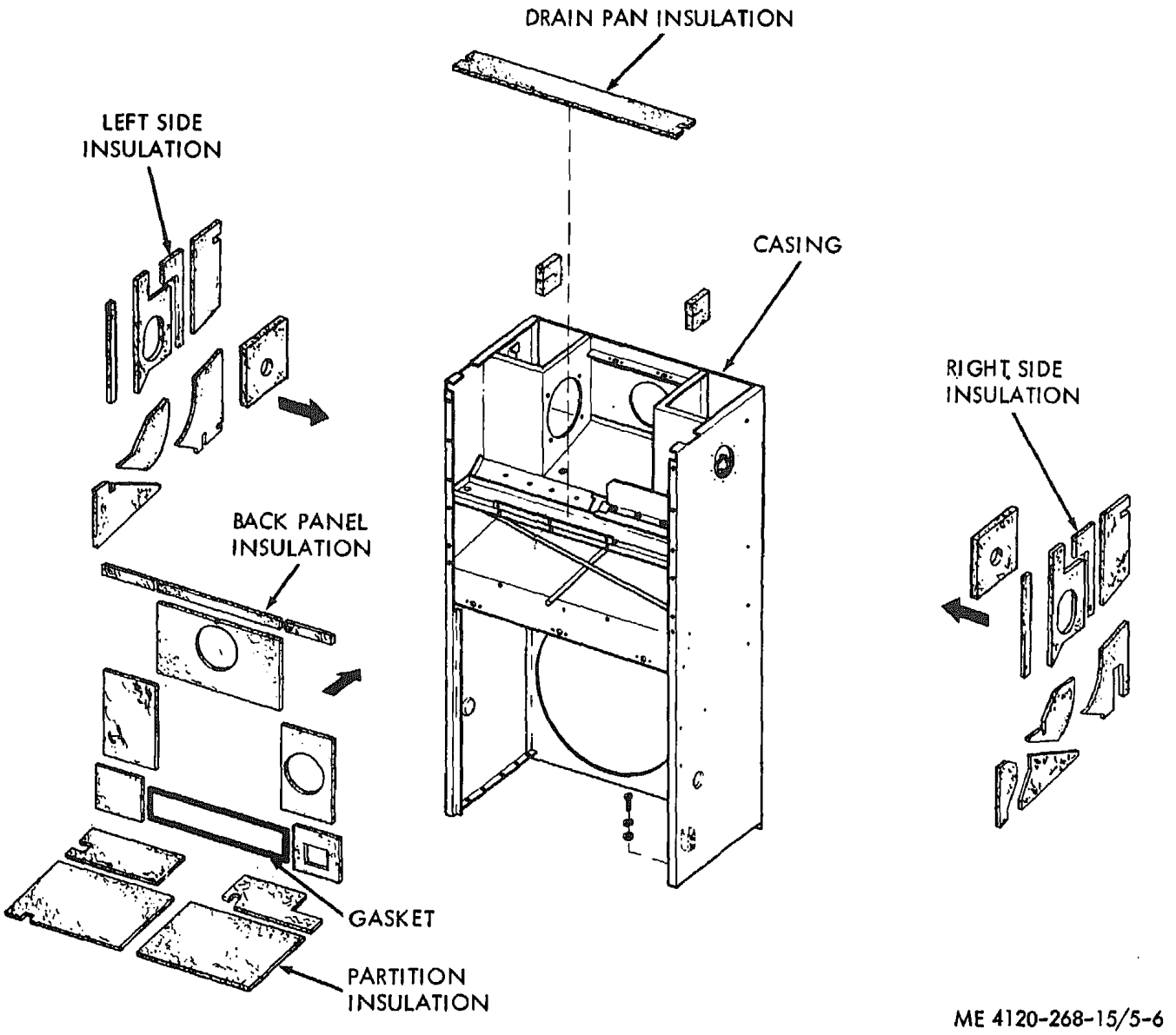


Figure 5-6. Casing insulation, exploded view.

CHAPTER 6

SPECIFIC REPAIR INSTRUCTIONS

Section I. REFRIGERANT SYSTEM

6–1. General

This section contains those items which are considered part of the air conditioner refrigerant system. They consist of expansion valves, solenoid valves, pressure sensing valves and switches, compressor assembly, coils and refrigerant tubing. Replacement of the compressor and coils are covered in paragraphs 5–14 through 5–16. This section also includes pressure testing and leak testing instructions. Components of the regrigeration system are handled separately in this section, however, whenever tubing or fittings must be removed or refrigerant joints unsoldered, the general instructions contained in paragraph 6–4 must be observed.

6–2. Operating Pressure Test

If the air conditioner is losing cooling capacity, or is in some way not functioning properly, a check of refrigerant system operating pressure will frequently lead to cause of malfunction. Install pressure gages on gage ports of suction and discharge line access valves (fig. 6–1) and turn valves two turns to open, exposing gages to system pressure. Start air conditioner and compare gage readings with normal ranges of system pressure listed in table 6–1.

Table 6–1. Normal Operating Pressures

OUTDOOR AMBIENT—DEGREES F	50°	75°	100°	125°
90°F DRY-BULB RETURN AIR TO UNIT:				
Suction line (psig)	58—65	58—70	60—75	75—90
Discharge line (psig)	125—160	175—210	255—295	370—410
80°F DRY-BULB RETURN AIR TO UNIT:				
Suction line (psig)	58—65	58—70	60—75	65—75
Discharge line (psig)	120—155	170—205	250—290	370—410

Note. Dry-bulb temperatures are measured with an ordinary thermometer.

6–3. Leak-Testing Refrigerant System

a. Electric or Halide Torch Leak Detector. The preferred method of testing for leaks in the refrigerant system is by using a halide torch. A halide detector is used by passing the exploring tube over sweat-soldered fittings, all mechanical couplings, and valves. Also test coils, accumulator and receiver with halide detector. If refrigerant is leaking from the system, the flame of the halide torch will change from blue to green when the leak is small. If the leak is large, the flame will be dense blue with a reddish tip; or, a large leak may extinguish the torch. Mark all spots where leaks are detected. Drain the refrigerant system (para 6–4) and repair the leak. Pressure test, evacuate, and recharge system (para 6–17 and 6–18).

***Warning:* Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that Refrigerant-22 does not come in contact with the eyes. In case of refrigerant leaks, ventilate the area immediately.**

b. Soap Solution Method. Operate the air conditioner, brush all possible points of leakage with soap solution, and watch for bubbles. Follow a definite sequence so all points will be thoroughly tested. Wipe the soap solution from all joints and mark any spot where a leak occurs. Drain the refrigerant system (para 6–4) and repair leaks. Pressure test, evacuate, and recharge system (para 6–17 and 6–18).

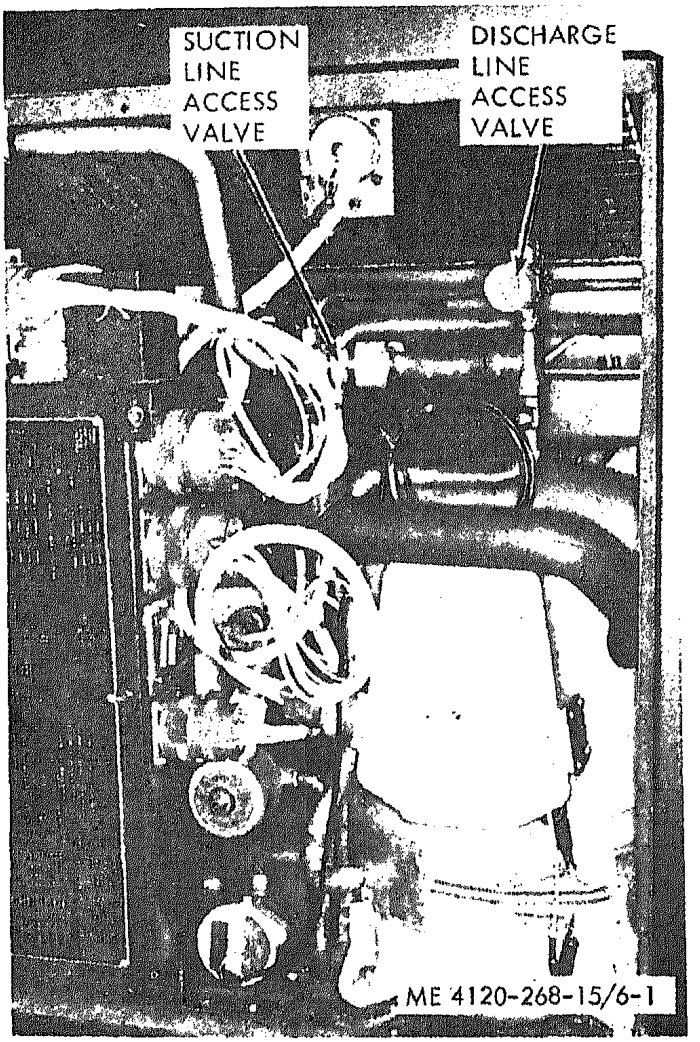


Figure 6-1. System access valves.

6-4. Refrigerant Tubing and Fittings

a. The refrigerant tubes used on the air conditioner consist of copper tubing and the necessary fittings. The joints of the refrigerant tubes are soldered. Inspect the tubing for cracks and breaks. Replace any defective tubing with tubes of the same length, size, shape, and material. Test the installation of tubes and fittings for leaks. Replace rubber insulation as necessary.

Note. If the refrigerant system has been open to the atmosphere, replace the dehydrator (para 6-8). Pressure test and evacuate the system before charging (para 6-17 and 6-18).

b. If the refrigerant system must be opened for repairs or replacement of parts, open the suction line access valve and relieve the system pressure. Connect a hose line to the suction line access valve and purge the refrigerant to an outside area.

Warning: **Avoid bodily contact with liquid Refrigerant-22 and avoid inhaling refrigerant gas. Be especially careful that Refrigerant-22 does not contact the eyes. In case of refrigerant leaks, ventilate the area immediately.**

c. After purging the system allow the tubing to warm to ambient temperature before opening the system; this delay will help prevent the formation of condensation on the inside walls of the tubing. Plug or cap all openings as a part is removed to minimize the entry of dirt and moisture.

d. Use a silver solder on all connections. Silver solder with a 50 percent silver capacity and a melting point of approximately 1160°F is recommended. Continually pass dry nitrogen through the tubing or connections being soldered to prevent formation of harmful copper oxides.

e. When removing and installing the solenoid valves, direct flame away from the valve body to protect it from heat damage. Keep the flame on the outside of the distributor when disassembling or reassembling the expansion valve.

f. No metal to metal contact is allowable on capillary tubes; use tape to prevent such contact.

6-5. Thermal Expansion Valves

a. General. A 3.6 ton thermal expansion valve controls the rate of flow of liquid refrigerant into the evaporator coil during the cooling cycle of operation. A 2.1 ton thermal expansion valve functions when the unit is in the bypass cycle of operation. Each expansion valve is provided with a superheat setting or adjustment (10°F for each model) to assure efficiency in the refrigerant system.

Note. A gas is superheated whenever its temperature is higher than the temperature corresponding to its pressure at saturation. Example: Refrigerant—22 at 69 pounds pressure has a temperature of 40°F. If the suction pressure gage reads 69 pounds and the temperature of the suction tube reads 50°F, the gas is superheated 10°F.

b. Adjustment. Refer to figures 6-2 and 6-3, and check and adjust the superheat setting of the 2.1 ton thermal expansion valve. The 3.6 ton thermal expansion valve adjusts in the same manner.

c. Testing.

(1) Stop the air conditioner and allow the suction line to warm up to ambient temperature. Remove the sensing bulb from its location against the suction line and place in an ice-water bath (32°F).

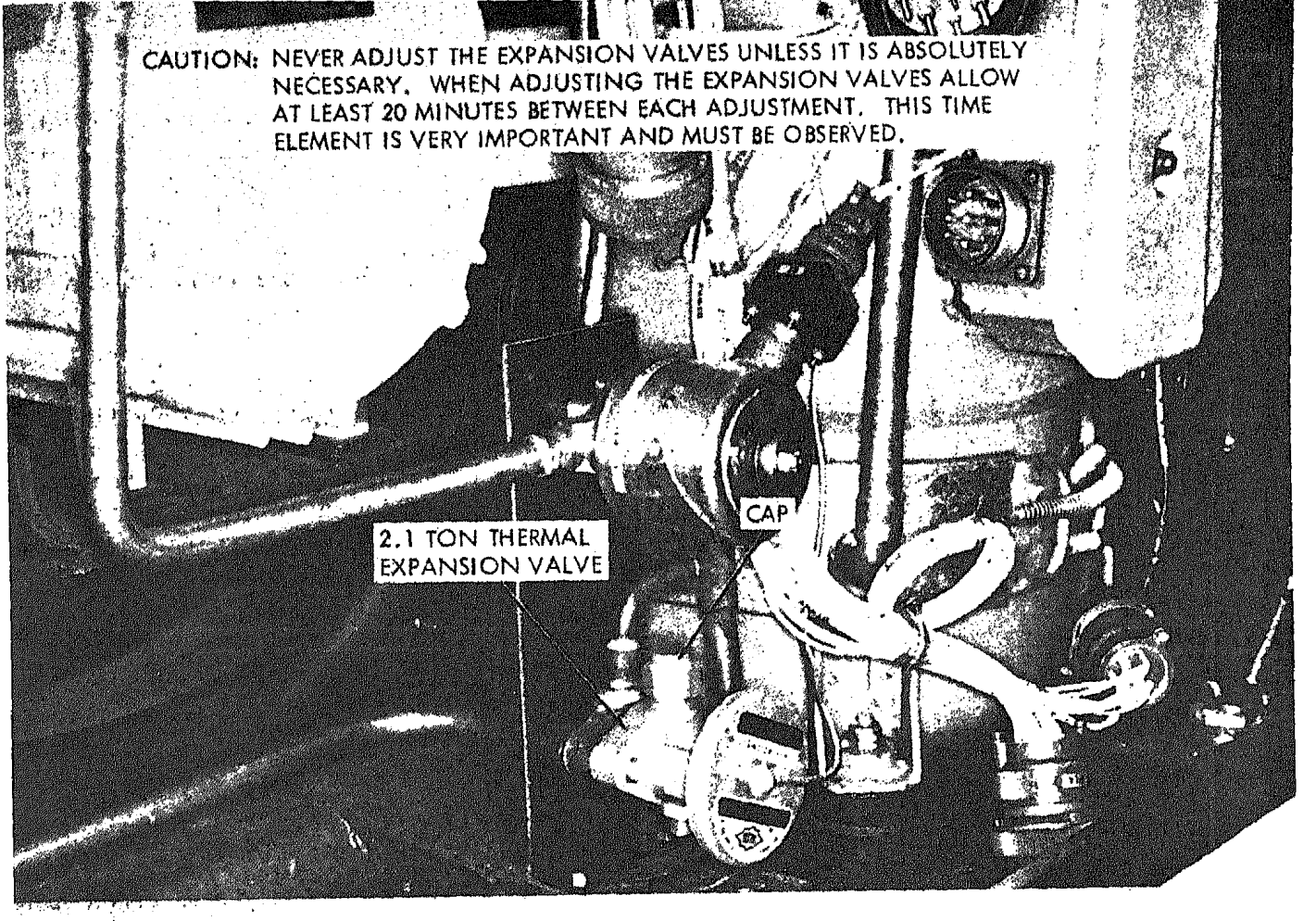


Figure 6–2. Thermal expansion valve superheat adjustment.

(2) Start the air conditioner, remove the sensing bulb from the ice-water bath and warm by hand while feeling the suction line. If the suction line temperature drops, the valve is operating correctly. Stop air conditioner and reinstall the sensing bulb.

(3) If there is little or no change in suction line temperature, the valve is defective and must be replaced.

Caution: **Do not warm sensing bulb in hand longer than necessary to check operation of the valve. The valve is wide open or nearly so**

during this procedure and excessive flood-back of liquid refrigerant into the suction line will damage the compressor.

d. Removal. Discharge the refrigerant system (para 6-4) refer to figures 6-4 and 6-5, and remove the thermal expansion valves.

e. Installation. Replace defective expansion valves and install in reverse order of removal as illustrated in figures 6-4 and 6-5. Test, evacuate and recharge the unit refrigerating system (para 6-17 and 6-18).

6-6. Pressure Equalizer Solenoid Valve

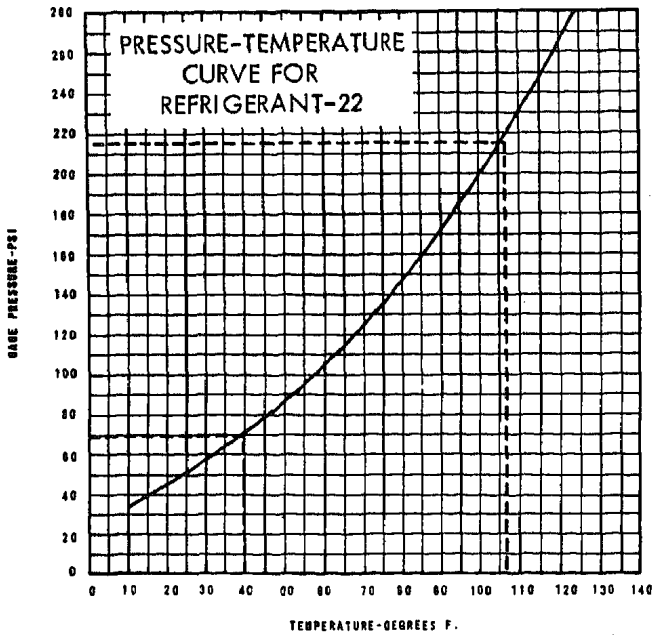
a. Removal. Discharge refrigerant system (para 6-4), refer to figure 6-6 and remove the solenoid valve.

b. Installation. Install solenoid valve in reverse order of removal as illustrated on figure 6-6. Test, evacuate, and recharge the refrigerant system (para 6-17 and 6-18).

6-7. Liquid Line Solenoid Valve

a. Removal. Discharge refrigerant system (para 6-4), refer to figure 6-7 and remove the liquid line solenoid valve.

b. Installation. Install solenoid valve in reverse order of removal as illustrated on figure 6-7. Test, evacuate, and recharge the refrigerant system (para 6-17 and 6-18).



ME 4120-268-15/6-3

6-8. Dehydrator

a. General. The dehydrator is a filter and drier for the refrigerant system. The dehydrator is to be replaced whenever the refrigerant system is opened for repair.

b. Removal. Discharge the refrigerant system (para 6-4). Remove dehydrator (fig. 6-7).

c. Installation. Install dehydrator (fig. 6-7). Test, evacuate, and charge system (para 6-17 and 6-18).

6-9. Liquid Sight Indicator

a. General. The liquid sight indicator indicates dryness of refrigerant and also indicates whether the system is fully charged or undercharged.

b. Removal. Discharge refrigerant system (para 6-4). Refer to figure 6-8 and remove the liquid sight indicator.

c. Installation. Refer to figure 6-8 and install the liquid sight indicator. Test, evacuate, and charge the system (para 6-17 and 6-18).

6-10. Back Pressure Regulating Valve

a. General. The back pressure regulating valve figure 6-9 regulates refrigerant pressure in the evaporator to prevent coil freeze up. The back pressure regulating valve also bypasses refrigerant gas from the discharge line to the suction line during bypass operation with the selector switch on "COOL". Valve is preset to establish a minimum of 57.8 psig in the evaporator.

b. Adjusting. Adjust the back pressure regulating valve, remove the button plug (fig. 6-9) at the top of the valve and turn the adjusting stem. Turning the stem clockwise increases (raises) the valve setting. Check system operating pressures (para 6-2).

c. Removal. Discharge the refrigerant (para 6-4). Refer to figure 6-9, and remove the back pressure regulator valve.

d. Installation. replace a defective back pressure regulating valve and install in reversing order of removal as illustrated on figure 6-9. Test, evacuate and recharge refrigerant system (para 6-17 and 6-18).

6-11. High and Low Pressure Cutout Switches

a. General. The high pressure cutout switch prevents the compressor from operating if the head pressure exceeds 445 psig (pounds per square inch gage). The low pressure cutout

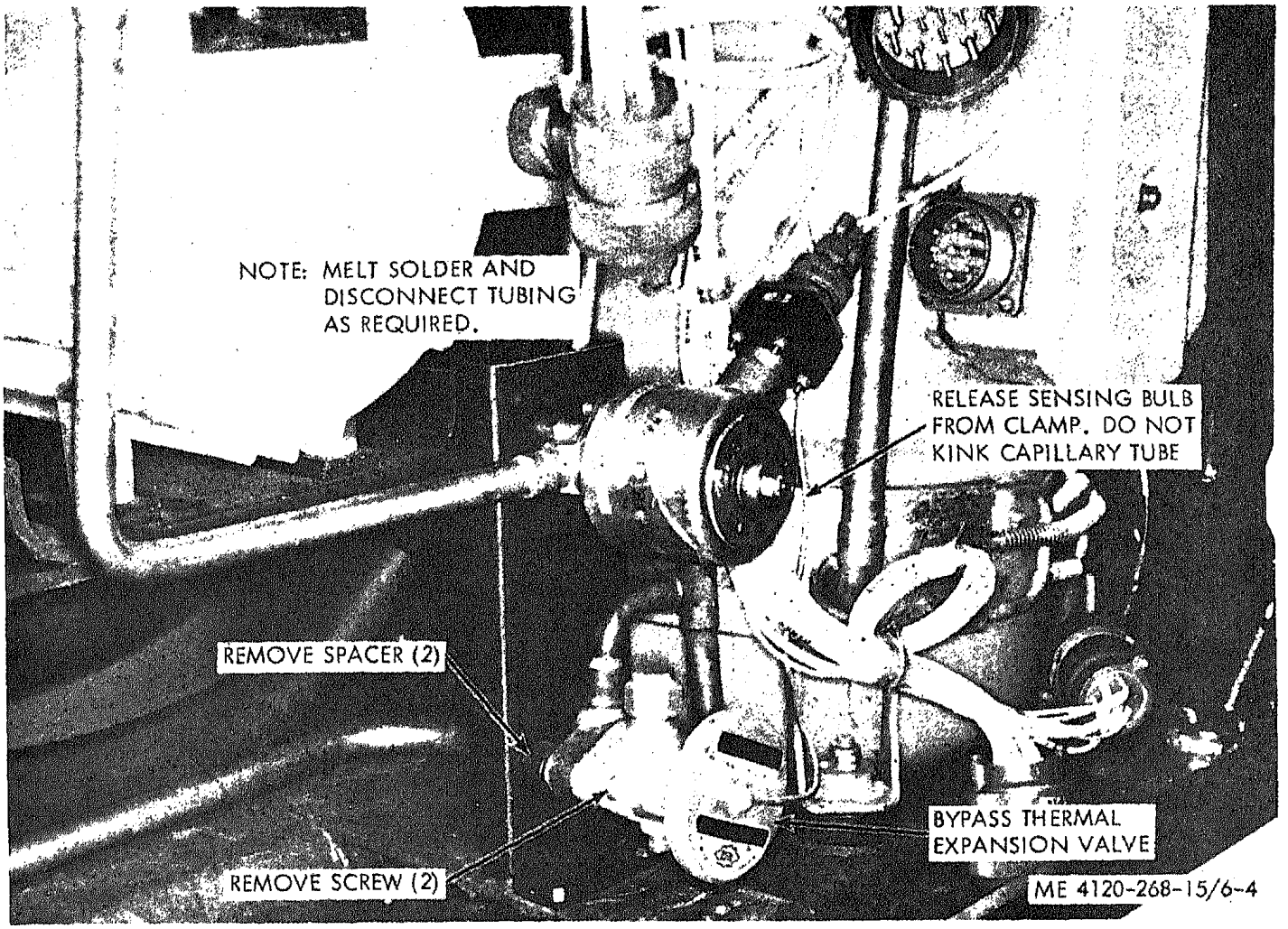


Figure 6–4. Bypase thermal expansion valve, removal and installation.

b. Removal. Discharge the refrigerant system (para 6–4) and remove pressure switch assembly as illustrated in figure 6–10.

c. Disassembly. Refer to figure 6–10 and disassemble pressure switch assembly.

d. Assembly. Refer to figure 6–10 and assemble pressure switch assembly.

e. Installation. Install pressure switch assembly in reverse order of removal as illustrated in figure 6–10. Test, evacuate and recharge the unit refrigerant system (para 6–17 and 6–18).

6–12. Pressure Relief Valve and Check Valve

a. General. The pressure relief valve (fig. 6–11) is located in a tee just above the condenser coil. The pressure relief valve protects the refrigerant system from excessive pressure. It is preset to open at a minimum pressure of 540 psig and is not adjustable. The check valve (fig. 6–10) is located between the pressure relief valve tee and condenser coil. The check valve prevents refrigerant in the accumulator from returning to the condenser coil.

b. Removal. Discharge the refrigerant system (para 6–4), refer to figure 6–11 and remove valves. Melt solder to remove check valve.

c. Installation. Install pressure relief valve and check valve by reversing order of removal as illustrated on figure 6–11. Pressure test, evacuate and recharge refrigerating system (para 6–17 and 6–18).

6–13. System Access Valves

a. General. Two diaphragm-type valves (suction line and discharge line) provide access to the refrigerant system.

b. Removal. Discharge the refrigerant system (para 6–4). Using a parallel jaw wrench, remove access valves (fig. 6–1).

c. Inspection. Inspect valves for damage, cracks and stripped threads. Replace valve if defective.

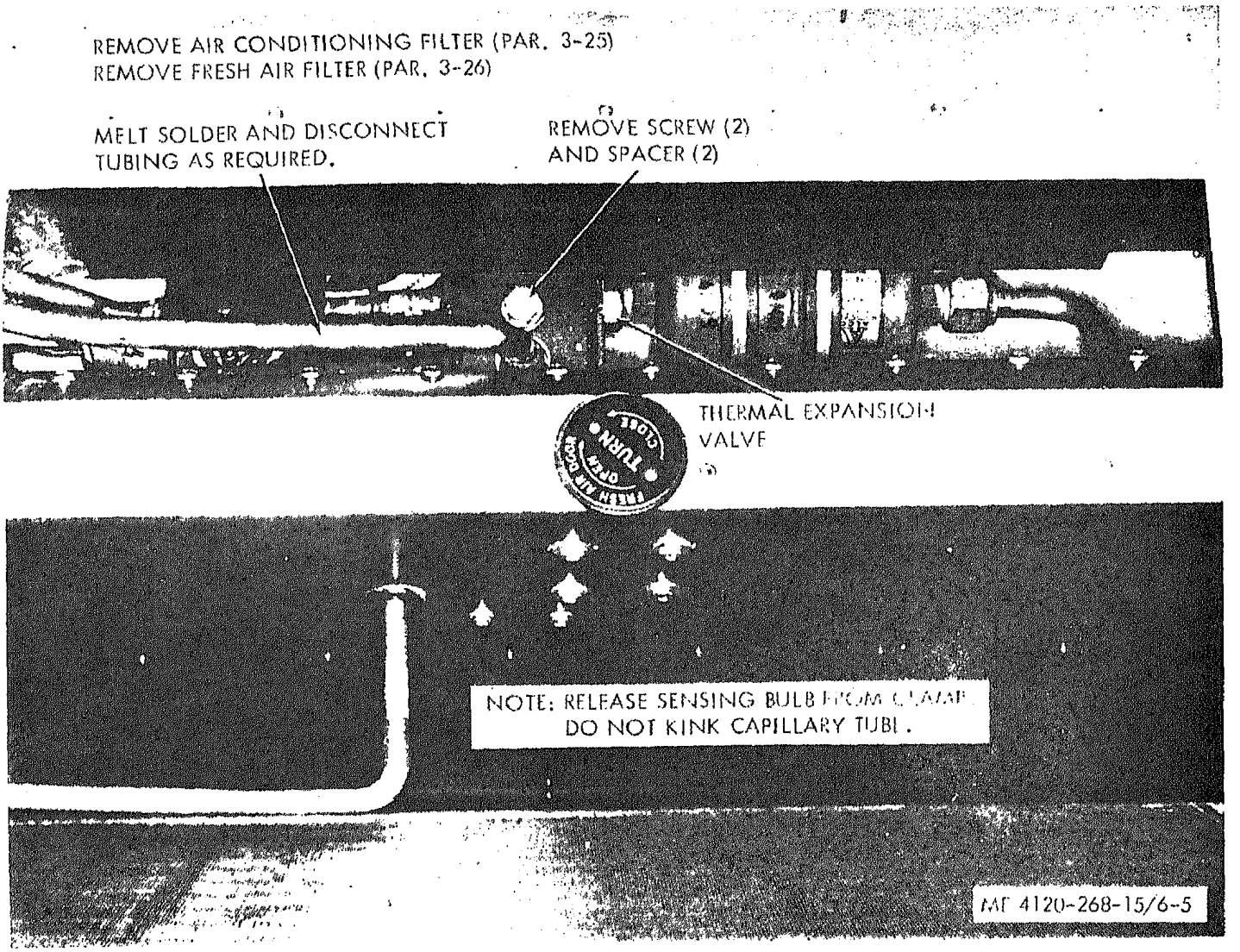


Figure 6–5. Thermal expansion valve, removal and installation.

d. Installation. Replace a defective valve and install valves in reverse order of removal as illustrated on figure 6–1. Test, evacuate, and recharge the unit refrigeration system (para 6–17 and 6–18).

6–14. Receiver

a. Removal. Discharge the refrigerant system (para 6–4). Refer to figure 6–12 and remove receiver.

b. Installation. Refer to figure 6–12 and install receiver in reverse order of removal. Test, evacuate, and recharge the refrigeration system (para 6–17 and 6–18).

6–15. Accumulator

a. Removal. Discharge the refrigerant system (para 6–4). Refer to figure 6–13 and remove accumulator.

b. Installation. Refer to figure 6–13 and install accumulator in reverse order of removal. Test, evacuate, and recharge the refrigeration system (para 6–17 and 6–18).

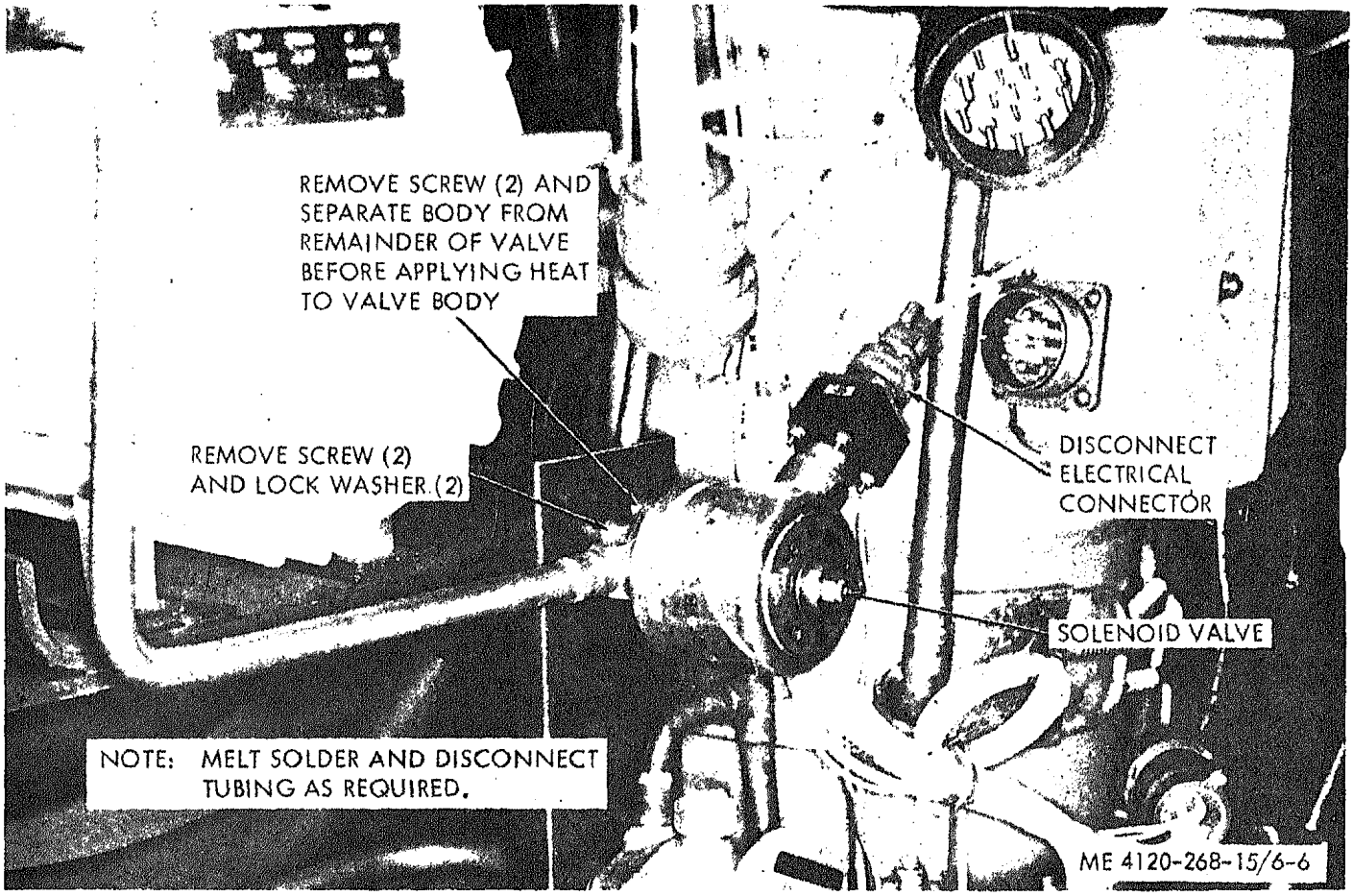


Figure 6-6. Pressure equilizer solenoid valve, removal and installation.

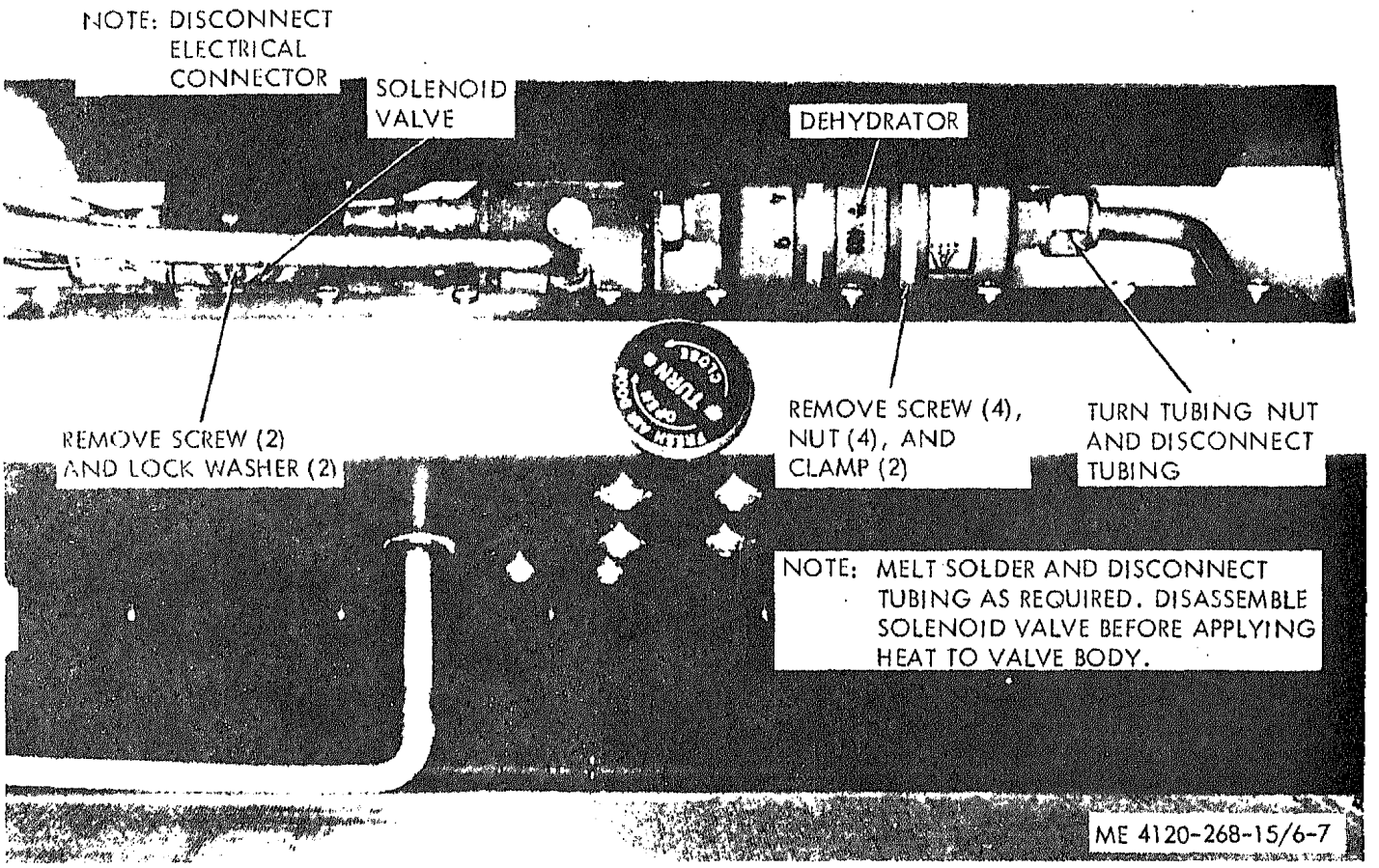


Figure 6–7. Solenoid valve and dehydrator, removal and installation.

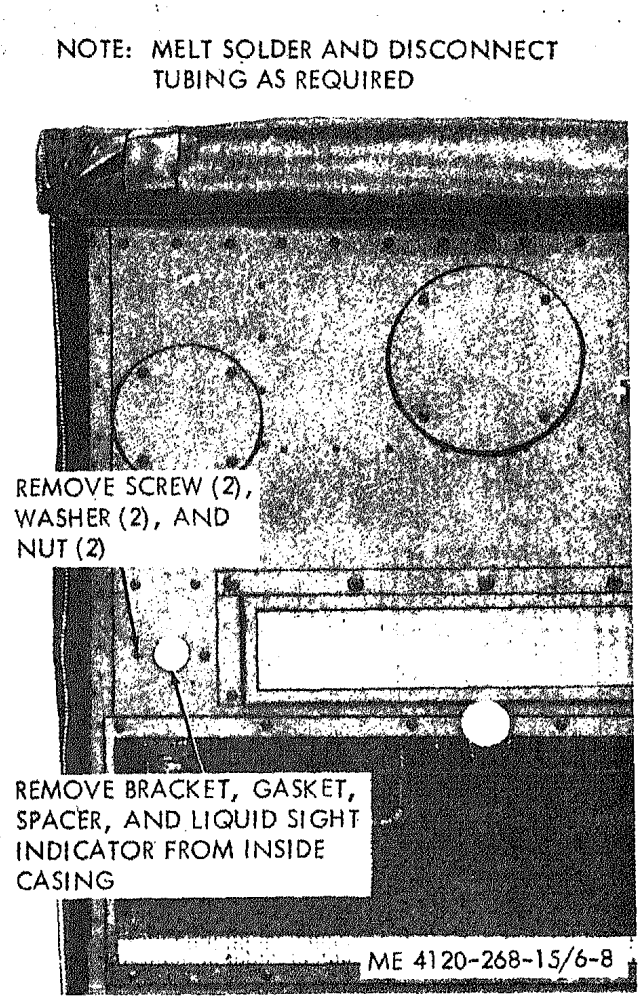


Figure 6–8. Liquid sight indicator, removal and installation.

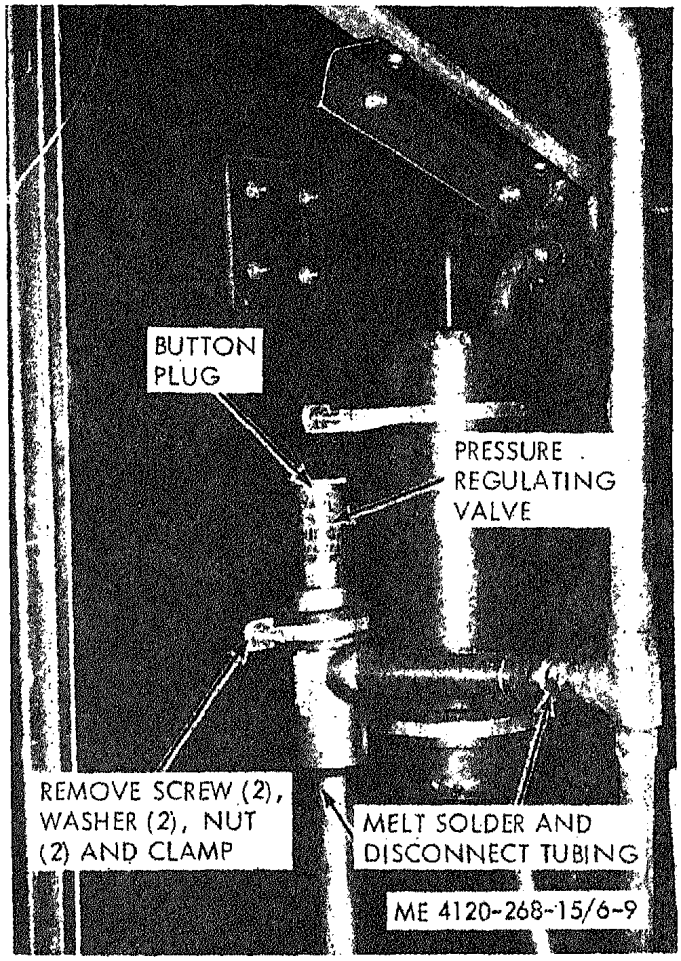


Figure 6–9. Pressure regulating valve, removal and installation.

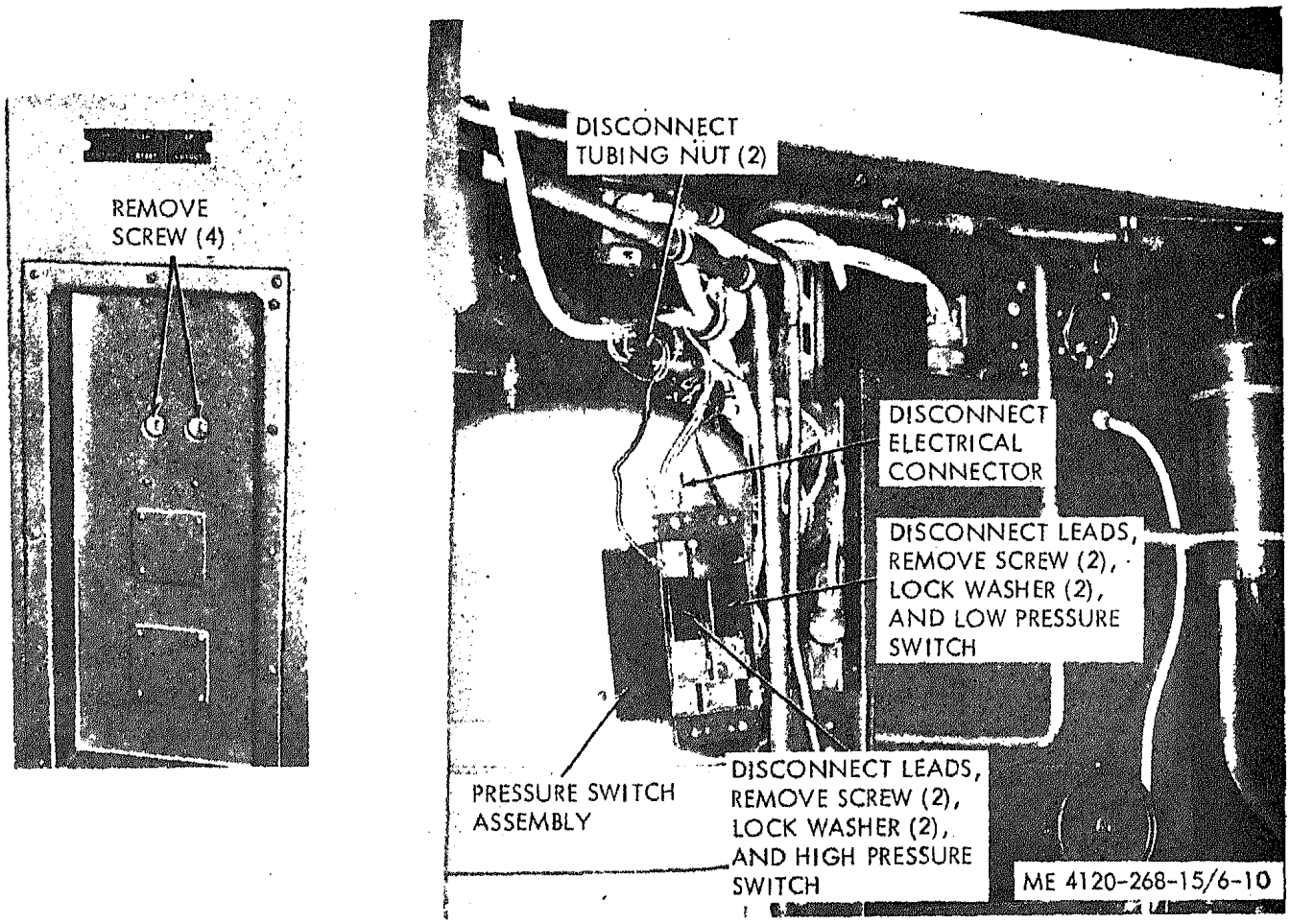


Figure 6–10. High and low pressure switches, removal and installation.

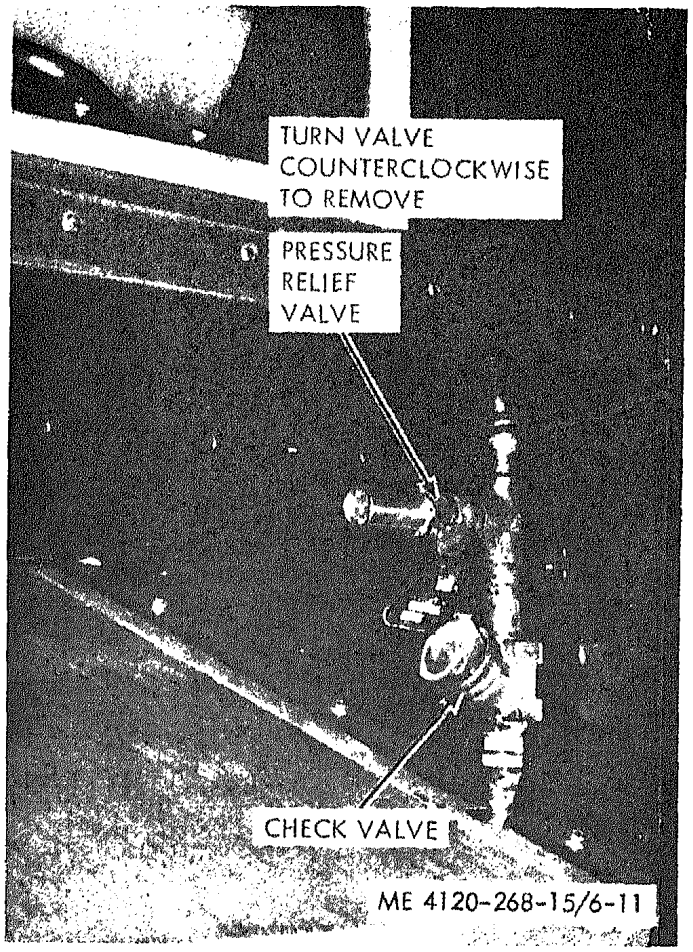


Figure 6-11. Pressure relief valve, removal and installation.

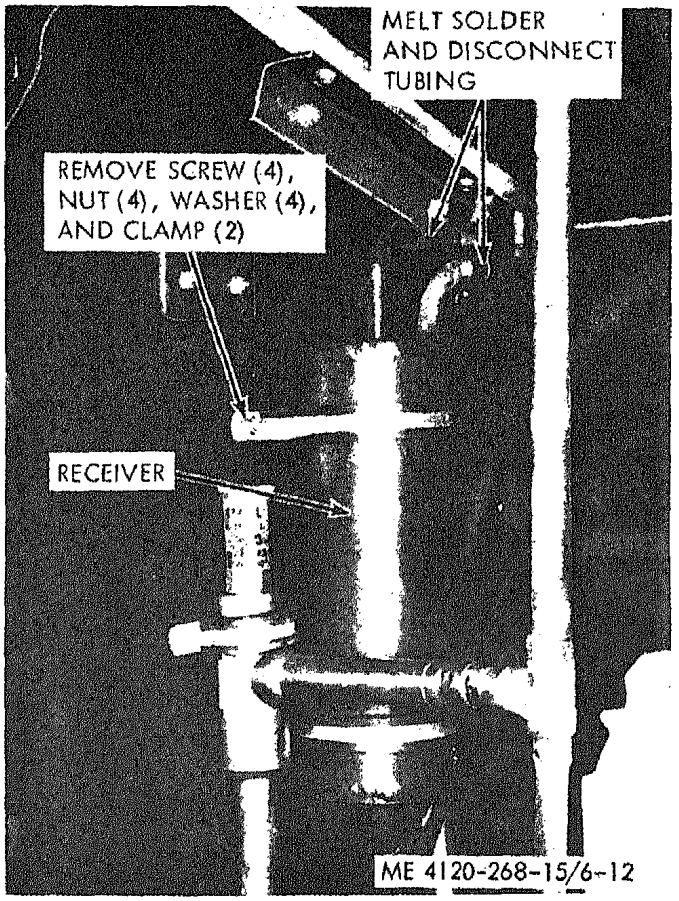


Figure 6-12. Receiver, removal and installation.

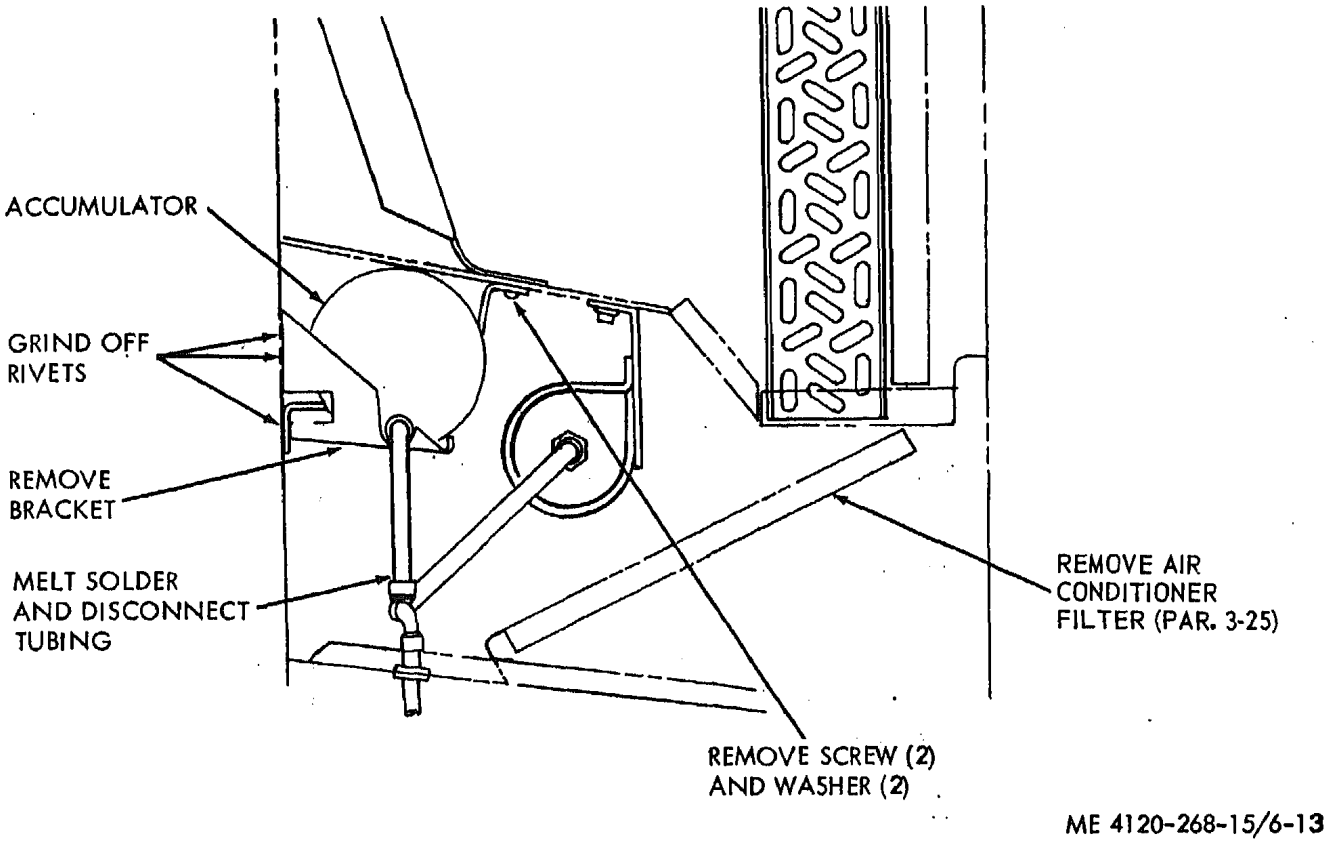


Figure 6-13. Accumulator, removal and installation

Section II. DISCHARGING, PRESSURE TESTING, EVACUATING AND RECHARGING THE REFRIGERANT SYSTEM

6-16. Discharging the Refrigerant System

Attach a suitable hose to the suction line service valve (fig. 6-1) and discharge the refrigerant into a safe area.

Warning: **Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that Refrigerant-22 does not come in contact with the eyes. In case of refrigerant leaks, ventilate the area immediately.**

6-17. Pressure Testing and Evacuating the Refrigerant System

After repairs have been made, the system is to be tested for leaks and weak connections. Refer to figure 6-14, and pressure test and evacuate the refrigerant system.

6-18. Charging the Refrigerant System

Refer to figure 6-15 and 6-16; charge the refrigerant system.

6-19. Flushing the System

a. General. A compressor motor burnout may cause high temperatures to develop in the compressor causing a breakdown of the oil and refrigerant, resulting in formation of acid, moisture, and sludge. All these are extremely corrosive and must be flushed from the system. Repeated burnouts will occur if all of the contaminants are not removed.

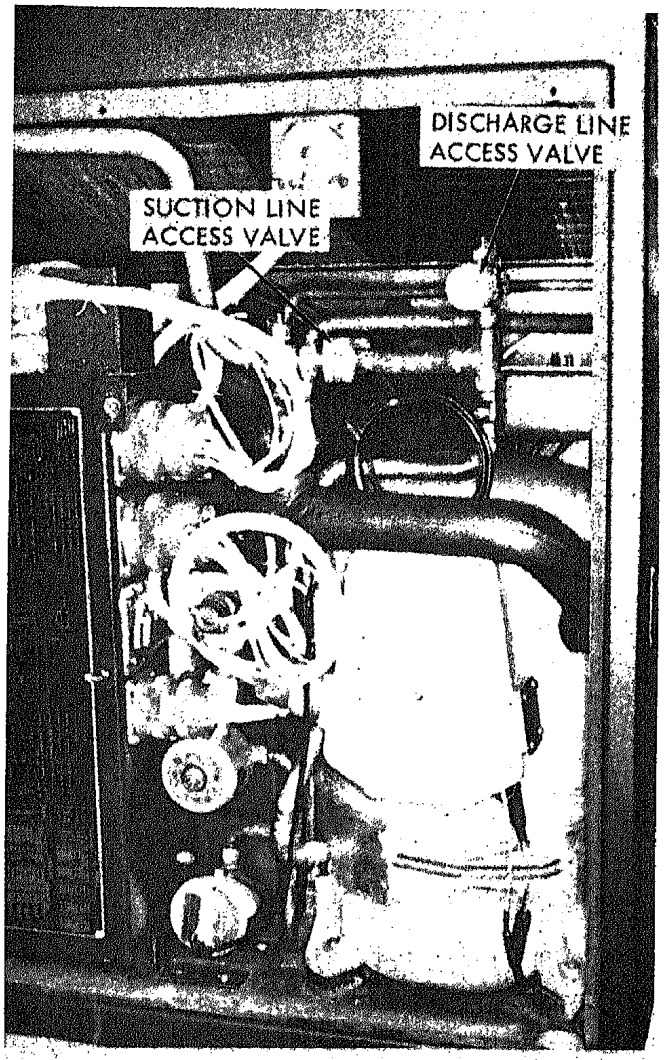
b. Flushing the System. After compressor motor burnout, flush the system as described below:

(1) Refrigerant—11, along with a small amount of dry nitrogen to force the refrigerant through the tubing, is recommended for flushing the system.

(2) Remove the dehydrator as described in paragraph 6-8.

(3) Flush the refrigerant tubing to remove all contaminants.

(4) The solenoid valves are normally open when de-energized. These valves must be open to



WARNING: AVOID BODILY CONTACT WITH LIQUID REFRIGERANT AND AVOID INHALING REFRIGERANT GAS. BE ESPECIALLY CAREFUL THAT REFRIGERANT-22 DOES NOT CONTACT EYES. IN CASE OF REFRIGERANT LEAKS, VENTILATE THE AREA IMMEDIATELY.

STEP 1. CLOSE ACCESS VALVES HAND-TIGHT. REMOVE CAP FROM SUCTION LINE ACCESS VALVE. INSTALL PRESSURE GAGE ON DISCHARGE LINE ACCESS VALVE AND OPEN VALVE.

STEP 2. CONNECT HOSE FROM REFRIGERANT CHARGING HOOKUP LOOSELY TO SUCTION LINE ACCESS VALVE. OPEN REFRIGERANT DRUM SHUTOFF VALVE SLIGHTLY TO PURGE HOSE. TIGHTEN CONNECTION AT ACCESS VALVE. OPEN DRUM SHUTOFF VALVE AND OPEN SUCTION LINE ACCESS VALVE.

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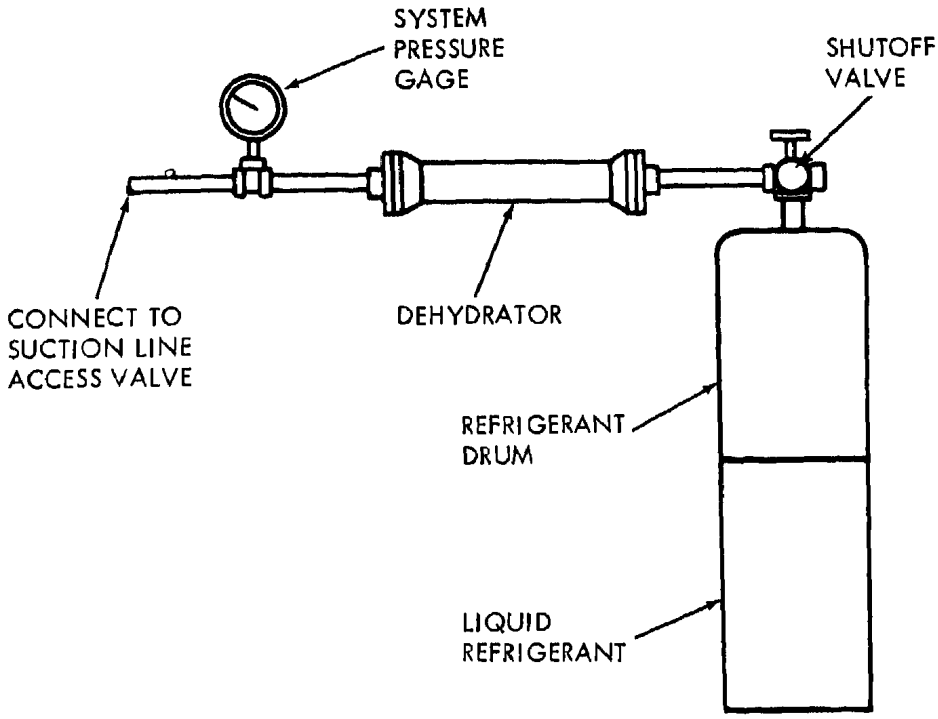
Figure 6-14. Pressure testing and evacuating refrigerant system (Sheet 1 of 3).



NOTE: REFRIGERANT DRUM MUST BE IN UPRIGHT POSITION TO ALLOW ONLY GASEOUS REFRIGERANT TO ENTER SYSTEM.

STEP 3. CLOSE THE DRUM SHUTOFF VALVE WHEN THE DISCHARGE LINE PRESSURE GAGE REACHES 10 PSIG. CLOSE SUCTION LINE ACCESS VALVE AND DISCONNECT CHARGING HOSE FROM VALVE.

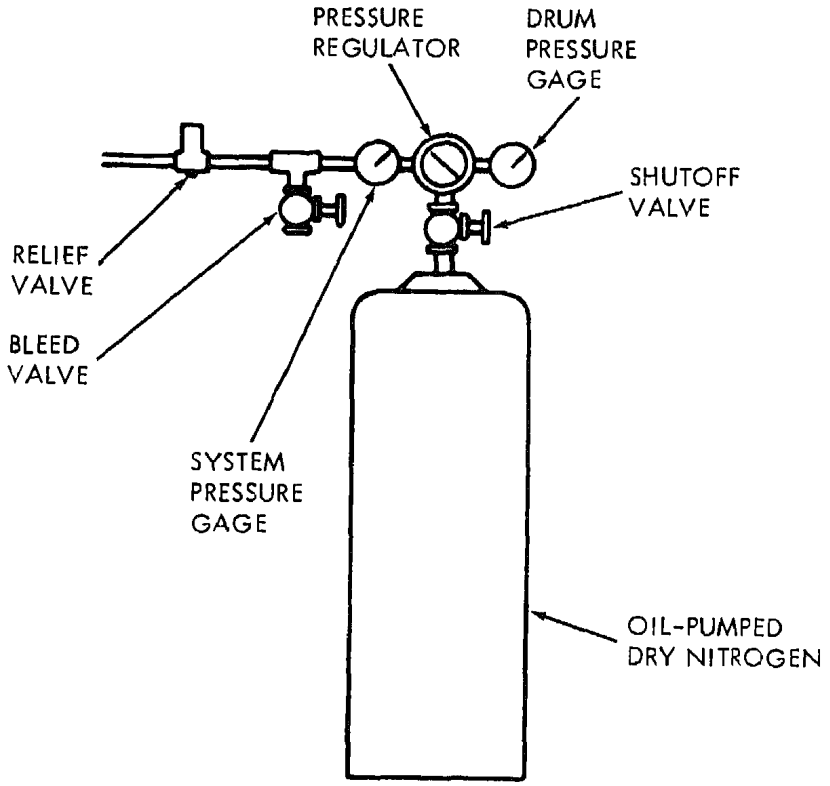
STEP 4. CONNECT HOSE FROM PRESSURE TESTING HOOKUP LOOSELY TO SUCTION LINE ACCESS VALVE. OPEN NITROGEN DRUM SHUTOFF VALVE SLIGHTLY TO PURGE HOSE. TIGHTEN CONNECTION AT SUCTION LINE ACCESS VALVE. OPEN SHUTOFF VALVE AND SUCTION LINE ACCESS VALVE. BUILD UP SYSTEM PRESSURE UNTIL DISCHARGE LINE PRESSURE REACHES 150 PSIG. CLOSE SUCTION LINE ACCESS VALVE AND SHUTOFF VALVE. DISCONNECT CHARGING HOSE FROM SUCTION LINE ACCESS VALVE. CLOSE DISCHARGE LINE ACCESS VALVE AND REMOVE GAGE.

STEP 5. TEST FOR LEAKS (PAR. 6-3). DISCHARGE THE REFRIGERANT SYSTEM (PAR. 6-16).

STEP 6. REMOVE CAP FROM DISCHARGE ACCESS VALVE. ATTACH A SUITABLE VACUUM PUMP TO SUCTION LINE ACCESS VALVE AND A MANOMETER TO THE DISCHARGE LINE ACCESS VALVE. OPEN THE ACCESS VALVES AND OPERATE THE VACUUM PUMP UNTIL THE MANOMETER INDICATES 2.6 MM HG. ABS. (MILLIMETERS OF MERCURY, ABSOLUTE).

ME 4120-268-15/6-14 ②

Figure 6-14. Pressure testing and evacuating the refrigerant system (Sheet 2 of 3).



STEP 7. CLOSE THE SUCTION LINE ACCESS VALVE AND STOP THE PUMP. ATTACH HOSE FROM REFRIGERANT DRUM, PURGE AIR FROM LINE WITH REFRIGERANT AND SLOWLY BREAK THE VACUUM BY OPENING THE SUCTION LINE ACCESS VALVE UNTIL MANOMETER INDICATES 760 MM HG. ABS. CLOSE SUCTION ACCESS VALVE.

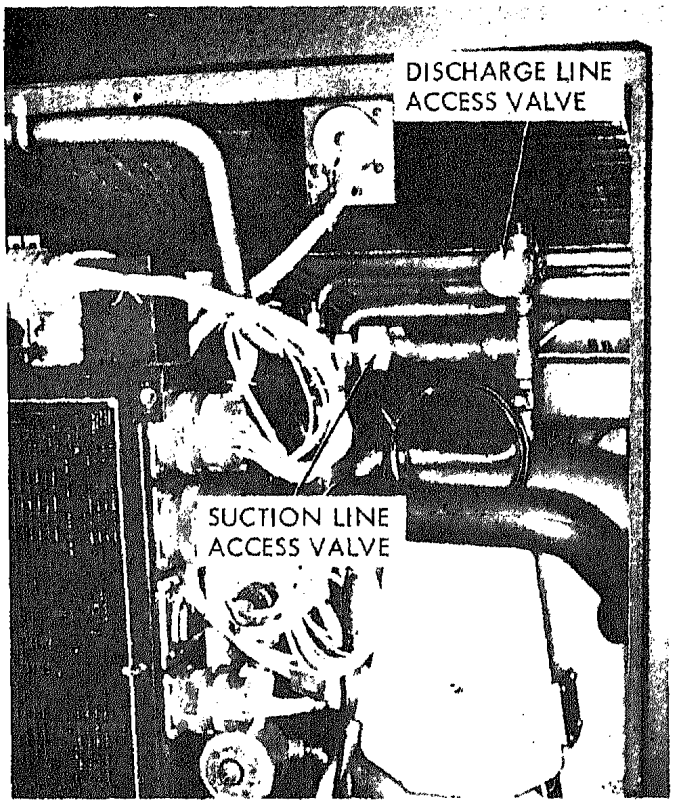
NOTE: RISE IN PRESSURE WILL BE INFLUENCED BY AMBIENT TEMPERATURE. MAKE SURE VACUUM IN SYSTEM IS COMPLETELY RELIEVED BEFORE RE-EVACUATING.

STEP 8. REMOVE REFRIGERANT DRUM AND CONNECT VACUUM PUMP TO SUCTION LINE ACCESS VALVE. PURGE AIR FROM HOSE, START PUMP AND OPEN SUCTION LINE ACCESS VALVE. OPERATE PUMP UNTIL MANOMETER AGAIN READS 2.5 MM HG. ABS.

STEP 9. CLOSE SUCTION LINE ACCESS VALVE AND ALLOW UNIT TO STAND UNDER VACUUM FOR APPROXIMATELY 12 HOURS. IF NO NOTICEABLE RISE IN PRESSURE OCCURS, THE SYSTEM IS READY FOR CHARGING. CLOSE ACCESS VALVES AND REMOVE VACUUM PUMP AND MANOMETER. INSTALL ACCESS VALVE CAPS.

ME 4120-268-15/6-14 ③

Figure 6–14. Pressure testing and evacuating the refrigerant system (Sheet 3 of 3).

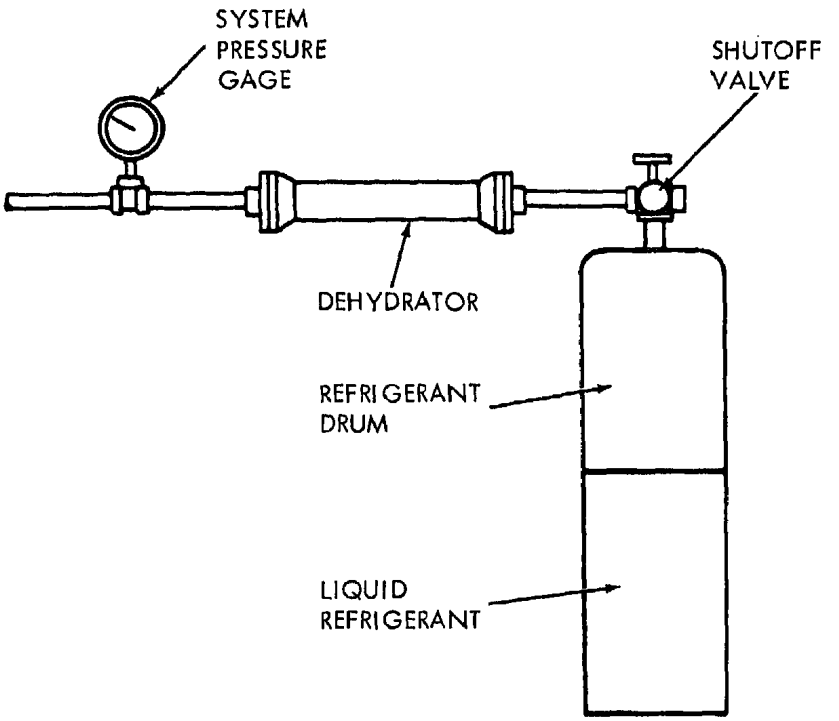


WARNING: AVOID BODILY CONTACT WITH LIQUID REFRIGERANT AND AVOID INHALING REFRIGERANT GAS. BE ESPECIALLY CAREFUL THAT REFRIGERANT-22 DOES NOT CONTACT THE EYES. IN CASE OF REFRIGERANT LEAKS, VENTILATE THE AREA IMMEDIATELY.

STEP 1. REMOVE CAPS FROM ACCESS VALVES.

ME 4120-286-15/6-15 (1)

Figure 6–15. Charging the refrigerant system (Sheet 1 of 3).



STEP 2. CONNECT A SUITABLE REFRIGERANT CHARGING PRESSURE MANIFOLD TO THE REFRIGERANT CHARGING HOOKUP. CONNECT SERVICE HOSES FROM MANIFOLD LOOSELY TO ACCESS VALVES. OPEN REFRIGERANT DRUM SHUTOFF VALVE SLIGHTLY TO PURGE HOSES. TIGHTEN HOSE CONNECTIONS AT ACCESS VALVES. CONNECT A PRESSURE GAGE TO THE SUCTION LINE ACCESS VALVE.

NOTE: SET REFRIGERANT DRUM IN AN UPRIGHT POSITION SO THAT ONLY GASEOUS REFRIGERANT WILL ENTER SYSTEM. TO FACILITATE SPEED OF CHARGING, SET REFRIGERANT DRUM IN WARM WATER. NEVER USE A HEATING TORCH FOR THIS PURPOSE.

ME 4120-268-15/6-15 ②

Figure 6–15. Charging the refrigerant system (Sheet 2 of 3).

NOTE: SET TEMPERATURE CONTROL ABOVE AMBIENT TEMPERATURE TO INSURE UNIT OPERATES CONTINUOUSLY ON COOLING CYCLE.

STEP 3. OPEN REFRIGERANT DRUM SHUTOFF VALVE AND ACCESS VALVE. START UNIT (PAR. 2-11) AND WEIGH IN 15.5 LB CHARGE OF REFRIGERANT-22. CONTINUE ADDING REFRIGERANT SLOWLY UNTIL SIGHT GLASS INDICATES FULL.

NOTE: OPERATE UNIT IN "COOL" POSITION ONLY DURING CHARGING OPERATION.

STEP 4. PARTIALLY BLOCK EVAPORATOR DISCHARGE GRILLE WITH A CARDBOARD BAFFLE. ADJUST BAFFLE UNTIL SUCTION LINE PRESSURE GAGE READS 55 PSIG. CONTINUE ADDING REFRIGERANT-22 SLOWLY, WHILE MAINTAINING 55 PSIG SUCTION PRESSURE BY ADJUSTING THE BAFFLE, UNTIL THE DISCHARGE PRESSURE GAGE READING OBTAINED CORRESPONDS TO THE AMBIENT TEMPERATURE (FIG. 6-3).

STEP 5. CLOSE ACCESS VALVES AND CLOSE REFRIGERANT DRUM SHUTOFF VALVE. STOP THE UNIT (PAR. 2-12). DISCONNECT CHARGING MANIFOLD HOSES FROM ACCESS VALVES. INSTALL VALVE CAPS (STEP 1).

ME 4120-268-15/6-15 (3)

Figure 6-15. Charging the refrigerant system (Sheet 3 of 3).

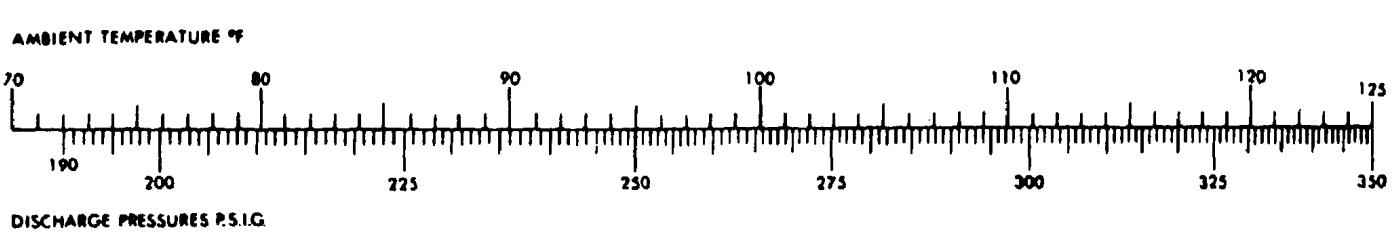


Figure 6–16. Discharge line pressures at constant 55 psi suction, ambient temperatures from 70°F. to 125°F.

APPENDIX A

REFERENCES

A–1. Painting

TM 9–213	Painting Instructions for Field Use

A–2. Radio Supression

TM 11–483	Radio Interference Suppression

A–3. Maintenance

TM 38–750	Army Equipment Record Procedures
TM 5–4120–268–25P	Department of the Army Technical Manual; Organizational, Direct and General Support, and Depot parts and special tools list
TM 5–764	Electric Motor and Generator Repair

A–4. Shipment and Administration Storage

TB 740–93–2	Preservation of USAMEC Mechanical Equipment for Shipment and Storage
TB 740–90–1	Administrative storage of Equipment

APPENDIX B

BASIC ISSUE ITEMS

Section I. INTRODUCTION

B–1. Scope

This appendix lists items which accompany the air conditioner or are required for installation, operation, or operator's maintenance.

B–2. General

This Basic Issue Items List is divided into the following sections:

a. Basic Issue Items—Section II. A list of items which accompany the air conditioner and are required by the operator/crew for installation, operation, or maintenance.

b. Maintenance and Operating Supplies—Section III. A listing of maintenance and operating supplies required for initial operation.

B–3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, section II.

a. Source, Maintenance, and Recoverability Codes (SMR).

(1) Source code, indicates the selection status and source for the listed item. Source code is:

Code	Explanation
P	Applied to repair parts which are stocked in or supplied from GSA/DSA or Army supply system, and authorized for use at indicated maintenance categories.

(2) Maintenance code, indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

Code	Explanation
C	Operator/crew.

b. Federal Stock Number. This column indicates the Federal Stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parenthesis.

d. Unit of Measure (u/m). A 2-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g, ft, ca, pr, etc.

e. Quantity Incorporated in Unit. This column indicates the quantity of the item used in the functional group or the assembly group.

f. Quantity Furnished With Equipment. This column indicates the quantity of an item furnished with the equipment.

g. Illustration. This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* Indicates the callout number used to reference the item in the illustration.

B–4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies Contained in Section III

a. Component Application. This column identifies the component application of each maintenance or operating supply item.

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the item name and brief description.

d. Quantity Required for Initial Operation. This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. Quantity Required for 8-Hours Operation. This column indicates the estimated quantities required for an average 8 hours of operation.

f. Notes. This column indicates informative notes keyed to data appearing in a preceding column.

B–5. Abreviations

ea ----------each
qt ----------quart
pt ----------pint

Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description: Ref No. & mfr code / Usable on code	(4) Unit of meas	(5) Qty inc in unit	(6) Qty furn with equip	(7) Illustration (A) Fig No.	(7) Illustration (B) Item No.
		Basic Issue Items Manufacturer or depot installed					
PC	5220–559–9618	Case, Manual	ea		1		
		Manual, Department of Army Technical Manual; Operator Organizational, Direct Support, General Support and Depot Maintenance Manual, TM 5–4120–268–15	ea		1		

Section III. MAINTENANCE AND OPERATING SUPPLIES

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required F/initial operation	(5) Quantity required F/8 hrs operation	(6) Notes
		AIR FILTER ADHESIVE			
Air Filter	9150–753–4764	Oil, Lubricating Grade—30 1 qt can	(1)	(1)	(1) Quantity required for stockage will be determined and authorized based on method of application used and frequency required for proper servicing.
	4130–860–0042	Coater, Air Filter Adhesive, 1 pt container	(1)	(1)	

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III Special Tools and Test Equipment. (Not applicable.)

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C-2. Explanation of Columns in Section II

a. Group Number, Column (1). The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. Functional Group, Column (2). This column contains a brief description of the components of each functional group.

c. Maintenance Functions, Column (3). This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew
O—Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D—Depot maintenance

The maintenance functions are defined as follows:

A—Inspect: To determine serviceability of an item by comparing its physical, mechanical and electrical characteristics with established standards.
B—Test: To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
C—Service: To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.
D—Adjust: To rectify to the extent necessary to bring into proper operating range.
E—Aline: To adjust specified variable elements of an item to bring to optimum performance.
F—Calibrate: To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.
G—Install: To set up for use in an operational environment such as an emplacement, site, or vehicle.
H—Replace: To replace unserviceable items with serviceable assemblies, subassemblies, or parts.
I—Repair: To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.
J—Overhaul: To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.
K—Rebuild: To resore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Tools and Equipment, Column (4). This column is provided for referencing by code the Special tools and test equipment (sec III) required to perform the maintenance functions (sec II).

e. Remarks, Column (5). This column is provided for referencing by code the remarks (sec. IV) pertinent to the maintenance functions.

C–3. Explanation of Columns in Section IV

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
18	BODY, CAB, HOOD AND HULL													
1801	Body, Cab, Hood & Hull Assy													
	Casing assembly	--	--	--	--	--	--	--	H					
	Casing	--	--	--	--	--	--	--	H					
	Cover, access	--	--	--	--	--	--	--	O					
	Cover, CBR	--	--	--	--	--	--	--	O					
	Damper door	--	--	--	--	--	--	--	O					
	Control, damper door	--	--	--	O	--	--	--	O					
	Grilles	--	--	C	--	--	--	--	O	O				
	Guard, condenser fan	--	--	C	--	--	--	--	O					
	Insulation	--	--	--	--	--	--	--	F					
	Panels	--	--	--	--	--	--	--	O					
	Gaskets, panel	O	--	--	--	--	--	--	O					
	Screens	C	--	C	--	--	--	--	O					
	Base	--	--	--	--	--	--	--	H					
22	BODY CHASSIS OR HULL & ACCESSORY ITEMS													
2201	Canvas, Rubber, or Plastic Items													
	Cover, Canvas	--	--	--	--	--	--	--	O					
2210	Data Plates:													
	Plates, data	--	--	--	--	--	--	--	O					
	Plates, information	--	--	--	--	--	--	--	O					
33	SPECIAL PURPOSE KITS													
3303	Winterization Kits:													
	Heater, compressor crankcase	--	O	--	--	--	--	--	O					
	Elements, heating	--	O	--	--	--	--	--	O					
40	ELECTRIC MOTORS													
4000	Motor Assembly:													
	Motor, condenser fan	--	O	--	--	--	--	--	O	O				
	Motor, evaporator fan	--	O	--	--	--	--	--	O	O				
4010	Master or Auxiliary Control Assembly													
	Junction box	--	--	--	--	--	--	--	O					
	Panel, Control	--	O	--	--	--	--	--	O					
4011	Circuit Breakers:													
	Circuit breaker	--	O	--	--	--	--	--	O					
	Fuse	--	O	--	--	--	--	--	O					
	Switch, high pressure	--	O	--	--	--	--	--	F					
	Switch, low pressure	--	O	--	--	--	--	--	F					
4012	Switches:													
	Switch, rotory selector	--	O	--	--	--	--	--	O					
	Switch, thermostatic	--	O	--	--	--	--	--	O					

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
	Compressor crankcase heater	--	O	--	--	--	--	--	O					
	Elements, heating	--	O	--	--	--	--	--	O					
	Temperature control	--	O	--	--	--	--	--	O					
4015	Relay or Assembly:													
	Relay, heater	--	O	--	--	--	--	--	O					
	Relay, motors	--	O	--	--	--	--	--	O					
	Relay, time delay	--	O	--	--	--	--	--	O					
4016	Coils:													
	Coil, solenoid valve	--	O	--	--	--	--	--	O					
4017	Transformers: Rectifiers:													
	Transformer, control circuit	--	O	--	--	--	--	--	O					
4018	Terminal Blocks, Junction Boxes:													
	Terminal boards	--	--	--	--	--	--	--	O					
	Wiring harness assembly	--	--	--	--	--	--	--	O	O				
	Fittings	--	--	--	--	--	--	--	O					
	Receptacles	--	O	--	--	--	--	--	O					
	Wiring	--	O	--	--	--	--	--	O	O				
4019	Radio Interference Suppression:													
	Filters, RFI	--	O	--	--	--	--	--	O					
	Ground leads	--	--	--	--	--	--	--	O					
	Rectifier	--	O	--	--	--	--	--	O					
50	REFRIGERATION AND AIR CONDITIONING COMPONENTS													
5200	Gas Compressor Assembly:													
	Compressor and motor assembly	--	O	F	--	--	--	--	F	O	--	--	--	A
5217	Refrigerant Piping:													
	Dehydrator	--	--	--	--	--	--	--	F					
	Fittings	--	F	--	--	--	--	--	F					
	Sight glass liquid indicator	O	F	--	--	--	--	--	F					
	Tubing	--	F	--	--	--	--	--	F					
	Valve, check	--	--	--	--	--	--	--	F					
	Valve, expansion	--	F	--	F	--	--	--	F					
	Valve, service access	--	--	--	--	--	--	--	F					
	Valve, solenoid	--	O	--	--	--	--	--	F	O	--	--	--	B
	Valve, pressure regulating	--	F	--	F	--	--	--	F					
	Valve, pressure relief	--	--	--	--	--	--	--	F					
5224	Refrigerant Accumulator:													
	Accumulator	--	F	--	--	--	--	--	F					
	Receiver, liquid	--	F	--	--	--	--	--	F					
5230	Condenser:													
	Coil	--	F	O	--	--	--	--	F					
5241	Evaporator:													
	Coil	--	F	O	--	--	--	--	F					
	Condensate drain assy	--	--	O	--	--	--	--	F					
	Drain hose	--	--	O	--	--	--	--	O					
	Drip pan	--	--	O	--	--	--	--	F					
	Tube, gooseneck	--	--	O	--	--	--	--	O					
	Valve, check	--	--	O	--	--	--	--	O					
	Eliminator, mist	--	--	O	--	--	--	--	O					

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
5243	Blower Assembly:													
	Condenser fan	--	--	--	--	--	--	--	O					
	Evaporator fan	--	--	--	--	--	--	--	O					
5244	Thermostatic Controls:													
	Temperature Control	--	O	--	--	--	--	--	O					
5245	Air Filters:													
	Filter, air conditioning	--	--	O	--	--	--	--	O					
	Filter, fresh air	--	--	O	--	--	--	--	O					

Section IV. REMARKS

Reference code	Remarks
A–1	Repair by replacing defective external components only.
B–1	Repair by replacing coil.

INDEX

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
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Chief of Staff.

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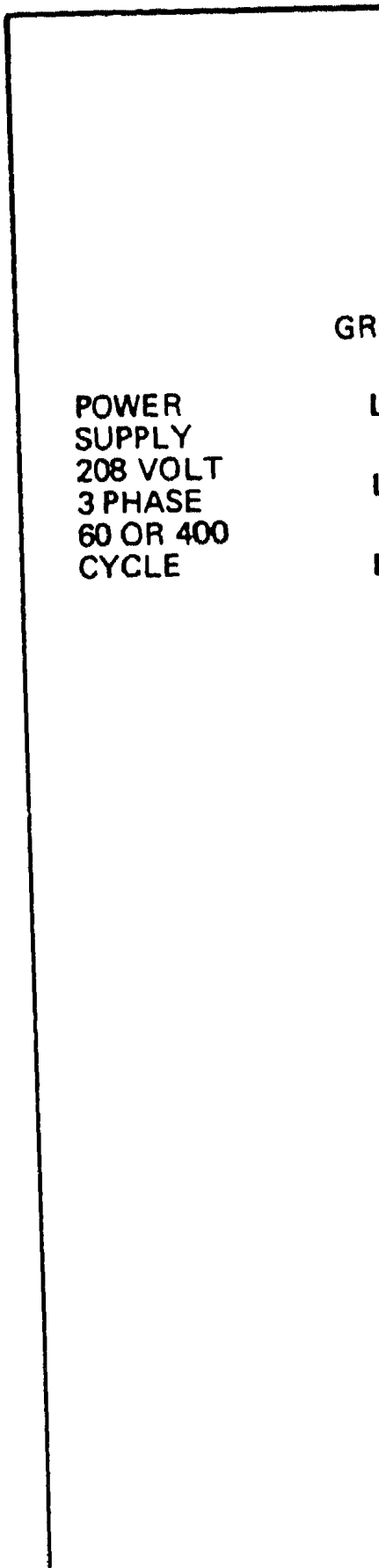
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